THE EXPERT CALCIMINER

A HANDY MANUAL FOR INTERIOR DECORATORS

Containing Full Directions for Mixing and Applying All Kinds of Water Color to Interior Walls and Ceilings, Including Cold and Hot Water Calcimines or Paints, Flat Wall Paints, Whitewash and Tints, Etc.

Also How to Prepare and Apply Water Colors of Various Kinds to Exterior Surfaces, Including Casein Water Paints and Other Water Paints, With Many Formulas For Interior and Exterior Work, Also Price List For Calcimining

BY

A. ASHMUN KELLY

Author of *The Expert Sign Painter*, *The Expert Wood Finisher*, and *The Painter's Estimator and Business Book*. Also Editor and Publisher of *The Master Painter*

Formerly Head Instructor in Painting, Decorating and Sign Painting at the Indianapolis Technical Institute

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PREFACE TO FIRST EDITION

THE first book on the subject of calcimining was that known as *The Calciminer's Handy Book,* by P. W. Nelson, of the Muralo Co., New York. It was issued the first of the year 1907, or over five years ago. It being now out of print, with no probability of being issued again, I have written this present work, THE EXPERT CALCIMINER, to take the place of the *Handy Book* of Nelson, and have greatly enlarged and improved upon that excellent work, as any one familiar with both books will readily grant. My book is thorough and systematic, which the *Handy Book* was not. My book is not burdened with a lot of advertising matter, a feature that must appeal to the buyer of a text book. THE EXPERT CALCIMINER contains more text matter than the other book. The price is the same.

In the making of this book I have availed myself of every possible source of good information, drawing liberally on Mr. Nelson, an expert and teacher, and also on many long-experienced master painters and decorators. I have carefully edited all matter, have systemized the information for handy reference, made a complete price list, and have grouped items pertaining to different subjects under separate heads, so that it is an easy matter to find any desired information.

In the preface to Prof. Nelson's *Handy Book* appears this statement: "Without doubt there is great need of such a handbook." Also, "Several handbooks for painters have been printed, containing valuable information and useful formulas, but, as far as we know,

a handbook devoted exclusively to calcimining has never been published." It is a great pleasure to me to be able at this time to supply this need and give a handbook on calcimining worthy of the name, and abundantly fit to succeed *The Calciminer's Handy Book*. It will beyond doubt meet that need and have a large sale, as has been the case with that other much-needed book, *The Painter's Estimator*, which was issued November 6, 1911, and is nearly ready for a second edition of one thousand copies.

A. ASHMUN KELLY.

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CALCIMINING

How to Apply the Calcimine

THERE'S a difference between the manner of applying a calcimine and an oil paint, the one being flowed on, the other being spread rather sparingly and then well brushed out. Which fact explains why most painters are poor calciminers, only those having experience understanding how to do the work of calcimining right. There is a knack in handling a calcimine brush that comes to one only after considerable practice or experience. Usually the brush is worked too stiff. It should be handled with a free swinging motion, or as some one has aptly expressed it, like the swinging of a cow's tail in fly time. Fill the brush full of the color, and apply from the ends of the brush, not rubbing with the side or main body of the brush. Be sure to get an even coating on, and this may be effected by working the stuff with the tips of the brush after having applied the coating. Years ago, when we made our own calcimine, and made it hot, it was rather thin, and was applied and laid off very much the same as oil paint, the result being that the job lacked the appearance of body; it had a thin look, although the work looked very nice. Colors were rarely used, and only ceilings were done, as a rule. Since then we have learned to use cold calcimine, not hot, and to apply it while in a jellied state, not thin. The criss-crossing of the calcimine with the tips of the bristles will make slightly rough surface, but this will not appear as such, but

will give to the work a look of solidity and evenness, not obtainable with laid-off work.

As a rule, on a good surface, one coat is all that is really necessary. In fact, the one-coat work will be far better in every way than the two-coat work. Should the first coat fail to be perfectly satisfactory, it is better to wash it off and try again, rather than attempt to mend matters by giving it the second coat.

Should a second coat be given, then see that the first coat is perfectly dry before applying the second. This is necessary in order that the second coat may not rub up the first, for unless the glue in the first is not really hard-dry it will rub up. Also, there is danger of rubbing up if the first coat did not have plenty of glue in it. If you suspect this danger, then size the work with alum water, pretty strong, and cold. Let this dry perfectly before applying the second coat of calcimine. This will usually prevent any lifting of the first coat by the second coat. It is usual also to apply a coat of weak glue or soap size over the first coat of calcimine, when a second coat is intended, and as is usually done when the shop prepared calcimine is used.

Regarding the method of doing a wall or ceiling, there is a right and wrong way. The right way only needs be given. Start at corner when doing a ceiling, and work away from the light, which will throw the light on the work in such a way that it will be more plainly seen and followed. Take a narrow strip across, Nelson says about twelve to eighteen inches, though I think that rather a narrow space, but of course much depends upon conditions. Thus, in hot or warm weather, or in a warm room, it will be unsafe to take too broad a stretch, owing to danger of drying of laps. But when the room or the atmosphere in general is cool, a much wider strip may be safely taken, even up

to three feet. But you will govern yourself in accordance to conditions, as stated.

After having done the first stretch, go back to the point of beginning and do the next stretch, lapping the first stretch well, and working the stuff into the first also. Gently brush the lap with the tips of the brush. Be careful not to get any more material on the laps than there is on the rest of the surface.

Holidays are to be guarded against. These are sometimes also called cats' paws, and are simply places not properly coated. One is very apt to leave these holidays if not very careful, or if one's eyes are not the sharpest. And it occurs oftener on some tints than others, according to how readily the color may be seen when applied.

Begin on the wall at the top, and in a corner, and take down stretches that will insure wet laps, avoiding laps that will show when dry. Often, especially in cool weather, or when the atmosphere is at the best for the work, one may take almost any area with safety. Thus, over or around doors and other openings, one may take any amount of area in reason without danger of laps.

Should a lap occur while you are applying the calcimine, wet it with clear water, using a clean calcimine brush, and then apply the coating as usual, on the succeeding stretch. But it is better to avoid the laps.

Just as soon as the job is finished give it all the air it can have, in order to hasten the drying. If left too long in the wet the calcimine is likely to come out clouded or spotted, particularly when a dark tint has been used. If the weather is damp, then have a fire made, if there is none in the room. But have the free circulation of air also.

Making and Using the Calcimine

Calcimine is in its best condition for application to any wall or ceiling of good condition when in the jellied state. Whether prepared with cold or hot water, this rule holds equally good, jell it before using.

In warm weather the jelly will form better by adding a lump of ice to it, having added its equivalent less in the water content. A better way, perhaps, is to make the calcimine and let it stand in a cool place, say the cellar, or if possible the refrigerator, in the former place over night, and in the latter long enough to jell it.

In warm weather, when the calcimine is apt to dry too quickly, the addition of a little Irish moss, made into a size with water, will keep the calcimine "cool," or easy working, and prevents it from drying too rapidly. It is a binder, though a weak one, hence does not injure the calcimine.

It is better to add a few drops of cabolic acid or formalin to the calcimine in warm weather, to prevent partial decomposition. If your calcimine goes watery in warm weather it is because it has spoiled. The best plan is to make the calcimine fresh daily, in summer.

If the calcimine refuses to jell it contains too little glue. The rule is about three ounces of best white glue to the pound of whiting.

Always strain the calcimine before using it, and the best time for this is just after having made it; then set it away to jell. Use a regular calcimine strainer, though any strainer of fine enough mesh will answer. It is best, however, to have a regular strainer, as it is made for this special purpose, and is more convenient than another kind.

Alum is a good thing to add to the calcimine in warm weather, as it acts as a preservative and hardener at the same time. Boric acid, or borax, or formalin, or carbolic acid, all make good preservatives against decomposition. But when the calcimine is made fresh each day it will need no preservative, though the addition of a little acid, as indicated above, will sweeten and keep sweet the stuff after it is on the wall, for we should look also after the sanitary part of our work. The objection against water colors and wall papers is based on sanitary grounds.

Never use the calcimine while it is still warm, for it will not give as good a job, and will be absorbed more than the cold or jelled calcimine by the plaster, if the plaster is poor and not well sized. There is danger also of laps. Jelled calcimine will slip easily over a hard surface, and show no laps.

Should your calcimine prove to be too stiff for easy use, thin it with cold water, but be very careful to not get it too thin; add the water a little at a time.

The calcimine is jelled about right when your brush will stand upright in it, although this is a rather crude test. Better try it first, by application, and if it fails to work satisfactorily, then make it right, washing off the part you tried it on.

If more than one coat of calcimine is applied, each coat must be identical of color or tint.

Zinc white being neutral, any pigment may be used as a tinter, but with whiting it is different, for many of the pigments are injured by the lime in the whiting, a full list of such pigments being given in another place.

The makers of certain water paints sell a fluid for thinning it with, and this should be used in thinning, not water, which would destroy the body of the paint.

Where no such liquid is indicated, then use water or diluted size.

Calcimine should be mixed in and used from a galvanized pail, never from a wooden pail. The wood absorbs the calcimine, and also may cause decomposition in warm weather.

When calcimining have doors and windows closed, but open them and get plenty of fresh air when the job is done, for slow drying is apt to produce spotted work.

The best results with calcimine come, after good workmanship, from the use of the best materials. Some whiting is coarse or gritty, and some is of inferior manufacture, being full of lime or other matter that will injure the work. Buy and use the best bolted gilder's whiting, or even the finer grades.

If the surface is painted, use rather thick calcimine, but apply it sparingly; if the surface is porous or soft, the calcimine may be used much thinner, but apply it freely or in a full coat.

The addition of a little phosphate of soda will make the calcimine waterproof to a certain extent.

The best calcimine whiting is what is known as floated, it is very fine and has great body, a very essential thing in a calcimine. Whiting is the best pigment material that can be used for calcimine. In some countries kaolin or white clay is used.

The advantage of cold water calcimine, as made by some manufacturers, lies in the fact that it is ready for use without delay; cold water is always on tap, whereas hot or boiling water is not always ready. By using a very finely ground glue it is quite easy to make up the calcimine with cold water.

Gypsum does not do so well for calcimine as whiting, as it soon sets in the bucket, is always settling,

and makes a dead porous surface, lacking in the egg-shell luster that we admire in whiting and glue calcimine work.

The color of the whiting is important, also its fineness. But it is even more important that it form a good jelly with the glue when mixed. If the whiting has lain damp, or has been over-heated in its making, it will not form the same jelly that good whiting does.

Calcimining a Sand Finish Wall

The preparation of the wall is about the same as that of a hard plaster wall, in that it must be made solid and perfect. Cracks are to be filled, large ones being cut out to form a key, and filled with a special plaster made of sand and lime, as follows: Mix clean, sharp seasand, two-thirds, with slaked lime, in thick paste form, one-third, and add a handful of plaster of Paris. Cut out the cracks clean, so that the edges will be firm, and the same with nail holes or any breaks, wet the parts with clear water, then fill the same with the mortar, pushing it firmly into the cracks, etc. Then rub the mortar over with what is called a float, this being a piece of board, with a wooden handle, and the bottom of the board may be covered with a piece of brussels carpet. Wet the parts before using the float on them, and rub over same with a sort of rotary motion. Wet the float now and then, and rub the work on either side of the crack or other break, so as to make it all uniform of appearance and texture. Very fine cracks may be filled in this manner, cracks too small to fill in the usual way. First fill the small cracks with a size of soap, alum and glue. Then mix up some lime and sand and a little plaster of Paris, making it like stiff paint, and apply it with a clean

paint brush, without any rubbing with the float; when dry you can calcimine over it and the effect will be perfectly solid.

If the walls are new and clean, one coat of calcimine will be enough.

The best brush for a sand finished wall is the heavy German pattern. If the other or regular kind is used, let it be one heavier than that used on hard walls.

Sand finish walls need no size if in proper condition. A coat of calcimine, thinned, is the best first-coater, if more than one coat is necessary.

The sand finished wall looks best with one coat of calcimine because then the sand finish effect is not obscured by the calcimine.

Imitation Sand Finish Wall.—This may be done on a hard plaster wall by applying two good coats of lead and oil paint, sanding the last coat, using a sand bellows, and blowing on all the sand the paint will hold. When this is dry, dust off loose sand and give it a coat of glue size. When dry, apply a coat of calcimine, and you will have a good "sand finished" job.

Alkali-Proof Liquid for Calcimine

Dissolve genuine gum Arabic (gum acacia) with water in sufficient amount to form a liquid of the consistency of honey, and to a quart of this add one-half to one ounce of pulverized borax, sprinkling in the liquid and stirring both together with a wooden or glass rod; stir until the mass becomes a brittle jelly, and so thick that it is difficult to stir it. Then add hot water to make it of a proper consistency for thinning pigment or whiting with. One quart of the jellified liquid will bear thinning with from four to six quarts of water.

This liquid jelly must be thinned out at once, as on standing an hour or so it will be very difficult to thin or dissolve it out for use; exposure to the air for a few days will turn it into a horny mass that boiling water will not affect. Yet it is best to let the thinned fluid stand, covered, a day or two before using, that it may deposit any superfluous borax.

Use only the best genuine gum acacia, for the poor or imitation gum Arabic or acacia will not jell at all. The larger the amount of borax used the thicker the mixture jellifies. Likewise the thinner the mucilage the longer it takes to jell.

The paint made with this liquid for the thinner will adhere to almost any surface, doing perfectly on stone, brick, tile, wood, plaster, mortar, glass, or metal, on rough or smooth surfaces alike. Exposure to the weather does not impair the colors. The surface coated with this paint will bear washing and scrubbing, after it has become dry-hard. The borax causes the mixture to harden upon exposure to the air. It may be used for fresco work, or any decorative work on walls, interior or exterior. It is proof against atmospheric influences and can be varnished over, when it will be fully as durable as oil paint of the best grade, and in one respect still more so, as there is no combination between the fresco color and the varnish laid over it; consequently, the varnished surface can be readily cleaned of all adherent dirt by passing a damp sponge over the varnished painting. Owing to the ready adhesion of the color wash on any surface or material there is great scope for introducing "fresco colors" in tins ready prepared for use, for they would give far greater scope for decorative treatment of walls than do enamel paints.

Calcimining Notes

Too much glue or alum will cause the calcimine to crack.

If calcimine rubs up on the second coat, add a little raw oil to it.

When thinning calcimine, use cold water, and use a very little, as little will do; avoid getting too much water in.

When melting glue for size for adding to calcimine, keep it stirred all the time, and do not let it get more than lukewarm; if too hot it will cause the calcimine to be "runny," and the mixture will not jell.

The best pigment bases for calcimine are those having a light specific gravity, such as terra alba, China clay, asbestine, whiting, soapstone, silica, zinc white, lithopone, etc.

To slow up calcimine, add a little glycerine, according to circumstances; anywhere from 2 oz. to 8 oz. Or add a little wheat flour paste.

Close windows and doors while calcimining, do the work quickly, and when done throw open the windows and doors.

If draughts of air strike the work while in progress it is apt to cause hasty drying and laps.

If the calcimine when done is too long about drying, it is likely to turn out spotty.

When calcimining an old oil painted surface the calcimine must be applied quite thick, hence is apt to look uneven. To overcome this stipple it.

Begin calcimining walls at the end farthest from the door, at the point opposite to that from which the walls are viewed by a visitor. In this way any visible joins will be less visible to the viewer.

Never go over a place that has been done; better wash it off and do it over.

To remove a lap, wet it with water, using a clean brush, then apply the calcimine as usual, on the next stretch, working it well over on to the wet lap.

If calcimining in wet or damp weather have a fire in the room, enough to remove the chill, but avoid getting the temperature of the room too high; a little cool is best, and a dry air and no drafts.

To make a white calcimine job look whiter add a little black or ultramarine blue, to take off the yellow cast.

Stippling improves the appearance of calcimined walls.

Don't get the glue size too strong in the calcimine.

Never apply the calcimine too heavy; painted walls take a heavier calcimine than plaster walls in the natural.

See that the wall or ceiling is in proper condition before beginning the calcimining.

Use plenty of calcimine; don't brush it out thin.

Avoid cats' paws or holidays; keep a sharp look-out.

If you have a large surface to calcimine and too few hands, stipple it.

If the walls are very yellow, the bluing of the calcimine is requisite to overcome the yellow.

Soak the whiting the day before using it; soak it over night. Pour water on it and let it soak through.

Get the tint right before adding the glue to the calcimine.

A calcimine is properly jelled when the brush will stand up in it.

Warm calcimine will be sucked in by a porous wall much more than when it has been jelled.

Jelled calcimine slips like grease and is easy to apply.

Glutol is preferred by many in place of glue in calcimine.

One ounce of glue to 12 ounces of dry pigment for tinting calcimine is a rule.

One man may easily do an average room ceiling with jelled calcimine, unless the air is too warm or the wall too hot.

Calcimine may be made to work easier, when it is working too hard, by adding about a tablespoonful of turpentine to the pail of stuff.

If a ceiling is calcimined before it is dry it will have a smeary appearance.

Cold Water Paint.—The ready-prepared cold water paints are manufactured in a dry powder form, and require only to be mixed with cold water to be ready for immediate use. To obtain good results it is necessary to be very careful when mixing the dry powder with the water. Sufficient water should be added to the powder to make the mixture a heavy, slimy paste, and this must be stirred with a paddle until free from air bubbles and lumps, after which more water is gradually added until proper working consistency is obtained. If air bubbles are found in the heavy mixture it is a sign that too much water has been added from the beginning. For brush work it should be used a little heavier than calcimine, but for machine work it must be used thinner. It order to obtain good and durable work it is necessary that the surface to be painted must be clean, firm and dry. Cold water paint is liable to peel if applied over calcimine, whitewash, old chalky lead paint or old weather-beaten wood. New wood, sand finish, stucco or brick make ideal surfaces for cold water paint. If the surface is damp the cold water paint will not have time to dry before the casein becomes decomposed, and then the white cold water paint becomes discolored, generally a bluish-

gray, and the binder in the paint is destroyed. When once dry the water cannot dissolve the casein.

Calcimine Formula.—Take 16 pounds of best Paris white and work it until free of all lumps; better sift it. Then add to it 1 gallon of boiling water, mixing it smooth. Having in the meantime soaked 8 ounces of white glue in 1 pint of cold water, until it has absorbed all the water it can, and has swollen up, which will take about a half-day, pour off the surplus water and pour onto the glue same quantity of water (boiling) as you poured off. Stir until smooth, then stir it in to the whiting. This will make a pail of calcimine, weighing about 25 pounds.

This calcimine may be used as soon as mixed, or while warm, but it will work easier if left to jell. It may be tinted by mixing up some color with water and adding it to the white calcimine by degrees, or until the desired tint is obtained. If a gray is desired, and lampblack is chosen as the tinter, add some borax to cold water and mix the black in it. Or hot water containing a little soap will do. A thicker calcimine may be had by adding less water, say one-half the quantity indicated. For tinting use lime-proof colors only, such as yellow ochre, sienna and umber, Venetian red, para red, iron oxide, ultramarine blue, ultramarine green, bone black, lampblack, etc.

A working formula given by one man is as follows: To 16 pounds of the best bolted whiting use one pound of white glue and one-half pound of pulverized alum. Place the whiting in a pail, and pour over it enough hot water (cold also will do) to soak it through. Place the glue in another vessel and pour over it enough water to cover it; the water may be cold or lukewarm, but not hot. Dissolve the alum in cold

water, and when all is ready mix the alum with the glue size. Then add the mixture to the whiting. Stir well with a stick, then pass it through a fine sieve. When it has become cool and jelled it will be ready for use.

You can tell after it has become cool whether it is too stiff or not; it should be about like a thin jelly.

A Gypsum Wall Finish.—Take 7 lbs. of terra alba and 1 lb. zinc white as the base. Make the size from 12 ounces of white glue melted in 2 lbs. water, and mix separately and add to the glue size a mixture of 2 oz. pulverized alum and 1 oz. sulphate of zinc, dissolved in 2 lbs. of hot water. Make up the calcimine and thin with a little hot water, to make it of right brushing consistency.

This gives a hard surface, very smooth, and is more sanitary than the ordinary calcimine. May be tinted as desired.

White Alabastine Calcimine.—What is known commercially as "Alabastine" is made in Michigan, it being a preparation of plaster of Paris and casein glue. Twelve pounds of this are mixed with two quarts of water, after which it is stirred to free it from all lumps. For walls that have no suction add three pints of water to the 12 lbs. For walls that have suction add not more than ¾ gallon of water. The amount of dry color that may safely be added to alabastine is 20 per cent.

Damp-Proof Calcimine.—For ordinary plastered walls. Take 16 pounds of best whiting and mix with a gallon of boiling water. Dissolve 4 oz. of phosphate of soda in a pint of boiling water, and add to the whit-

ing mixture. Have ready at the same time a solution of half-pound of good white glue in one-half gallon of water. Add to the calcimine while hot, and stir all together until perfectly smooth.

Ordinary calcimine may be made partially waterproof by adding a chrome alum solution, made by dissolving one ounce of chrome alum in ten fluid ounces of water. One fluid ounce of this solution is enough to a pound of dry glue, or roughly for a pail of calcimine.

Formalin of 40 per cent. solution also may be used to render calcimine partially waterproof. Add one part of formalin to 99 parts of water, and add a fluid ounce to a pound of glue, or same quantity as chrome alum.

The solutions given act upon the gelatin contained in the glue, hardening it, but as the gelatin content varies in glues care must be taken to not add too much, for it will make the glue, or gelatin, or casein, whichever is used, perfectly insoluble. Add the solution carefully, and try the calcimine as you proceed.

Washable water paints are increasing in popular favor, being durable as well as attractive. They look fine when stippled, and if varnished, using a good hard-drying varnish, they are especially durable, as well as pretty.

To Make Calcimining Glossy.—If a slight gloss is desired in the calcimined job, it may be obtained by adding an extra quantity of glue in same, but this will be at the risk of making a very brittle coating, one liable to crack.

Cold Water Paint.—Mix together 4 lbs. insoluble casein, 1 lb. powdered borax, 2 lbs. air-slaked lime, 10

lbs. bolted whiting, 28 lbs. terra alba. Keep in a dry place, in paper bag or keg, until wanted. It may be mixed in any desired quantity by simply mixing with water. If cold water is used let the mixture stand about 30 minutes; if wanted to apply at once, then mix with warm water.

Oil-Water Calcimine.—For 10 lbs. bolted whiting use ¾ lb. white glue, ½ lb. sal soda, and 1 quart of raw linseed oil. Dissolve the soda in a pint of hot water, and add to the oil, which mixture place on stove and boil until the mass becomes saponified. Mix in the glue solution, then mix all with the whiting.

Mixing Calcimine.—Soak the whiting the day before you are to use it. Weigh out the required quantity, then pour over it, in a pail, enough water to cover it; this water will slowly percolate through the dry mass, and soak it perfectly.

Use white glue or gelatine, as the finest white glue is called, for white and all light tints, and even for the dark colors or tints the white glue is best; at any rate, do not use very dark glue in any shade or tint of calcimine. Weigh out the required amount of glue, place it in a pail, and pour cold water over it, just enough to cover it, and in a few hours, more or less, the glue will have swollen up and be soft all through. Then pour off the remaining water, and pour on to the glue enough boiling water to melt it. Strain if necessary.

About three ounces of good glue to the pound of whiting is the rule, though more or less may be used, according to the texture of the wall, whether soft or hard. Too much glue will be apt to crack the finish on some surfaces, and on others pull the size and maybe the plaster off. This has occurred.

Colors for tinting should be mixed separately and not with the calcimine, but should be added to the calcimine or soaked whiting before adding the glue to the latter. Add a little color at a time, trying the calcimine for color now and then by wetting a piece of paper with it and holding it near the fire. Water color looks several shades darker when wet than when dried out. Use only the best tinting colors, those called frescoers' colors being best. They come in pound glass jars, ground in water, are very fine and represent the best quality of tinters. Never use dry colors.

Take the soaked whiting pulp, and break it up with your hands, then add any tinters desired, after which add the glue size, which should be rather weak for colors. Tinting colors that are not the best are lacking in tinting strength, hence will require more to tint to any given tint, and thus weaken the body of the calcimine.

After mixing the calcimine strain it, using a calcimine strainer, or if none is at hand, use cheesecloth. Then let it stand in a cool place to jell.

Poor glue will not let the calcimine jell in warm weather, the glue size coming to the top, and the pigment material sinking to the bottom. In such a case you will have either to make new calcimine, or place this batch in the refrigerator to cool and jell. But this remedy is not at all sure. In hot weather add a little boric acid to keep the calcimine sweet. In damp weather add a little alum, to harden the calcimine. To prevent the calcimine from drying too readily add a little Irish moss, which has been boiled, using the strained water from it. Add a little to the calcimine.

Hot Water Calcimine.—Somewhere in the 'seventies, I think, the factory-made calcimine appeared, and

it was mixed with hot water, according to directions. The stuff came in six pound packages, which was enough for an average ceiling. Since then packages have been reduced to five pounds. This, too, is enough for an ordinary ceiling. This made a very good job, and was easily prepared and applied. It is still made and used. It was made on a whiting base, with finely ground white glue for binder. It was the practice at first, if ever since, to let the calcimine become cold or jelled, but it was applied as soon as made, and usually two coats were given. This, of course, depended upon the condition of the wall. There were also many tints and pure white as well. The cost for white was 10 cents per pound, and for tints 11 cents per pound. Some thought, and some still think, that by applying the stuff hot it will give a more durable job, one with a harder surface. There was no difficulty about getting a kettle of boiling water from the kitchen madame when wanted, or if one had to wait until the kettle should boil, one could be doing something else in the meantime, and so no time was lost. In a very short time the kettle would be blowing off steam.

I mention these things because some make a great to-do nowadays about the inconvenience of the hot water process, and while I have no axe to grind in this matter, I must say these few words about hot water calcimine; I used it many years ago, and liked it, and did many a very nice looking and durable job with it. In fact, never had a job to witness against me as a workman. Still I prefer cold or jelled calcimine, whether made from hot or cold water, for it works slicker than hot or warm calcimine.

There is no difference whatever in calcimines made from hot or cold water, all else being equal. You can use the former without waiting for it to become cold,

and the latter may be used just as soon as mixed, without standing to jell. The best way, perhaps, is to let the stuff in both cases to jell before using.

Cold Water Calcimine.—The cold water calcimine may, and as a rule does, contain the same ingredients as the hot water calcimine, but it some cases it is probable that the makers of the cold kind add something that will assist the cold water to dissolve the binder, which we will presume to be good glue, very finely ground. By finely grinding the whiting and glue together, making the mass as fine as it is possible for the mill to do it, it is likely that cold water will easily enough dissolve the glue.

Cold water added to this calcimine dissolves the mass, but it must be stirred well for quite a while, in order to wet the stuff through and dissolve the binder. It is best not to add too much water at a time, but to gradually add it and work against the sides of the pail with the paddle. Ice-cold water should not be used, but just plain hydrant water.

Exterior water paint has a casein binder, hence must not be made with hot water; use cold water, and pour it on and let it gradually find its way through the mass. Exterior water paint has not been a success; it will not stand long against the weather.

Interior water paint that is made up with cold water has a glue binder, hence either cold or hot water may be used, though it is best, perhaps, to use one or the other, according to the manufacturers' directions. If cold water is used, pour it on top of the dry material and let it gradually wet the mass through. If you try to mix it at once by stirring it will likely become lumpy, and take a long time to make smooth. It will take about thirty minutes for the water to find its way

through the stuff. Then work it smooth with the paddle.

Some strain all calcimine, and the practice has much to commend it, yet when the mixing is done carefully the mass will be smooth enough. One advantage of straining is that if there is any bits of wood or other material of like nature in it, and which often occurs, the straining will take it all out. It hinders the work to remove foreign matters after you have the stuff on the wall, and if not removed the job will not look carefully done.

Hot water calcimine usually has as a binder animal glue, or in some cases a vegetable glue or even glucose. These dissolve readily in hot water, but are spoiled if mixed with cold water. Animal glue is used in many of the cold water calcimines, but the glue is prepared for the purpose.

If hot water is used, then pour it on the dry calcimine as directed for cold water calcimine, excepting that you will let it stand only a few minutes, then stir thoroughly and keep it stirred while in use.

If you have a metal surface to calcimine over, add a little glycerine to the calcimine.

In coloring the calcimine use those pigments that have been ground fine in water, and known as distemper colors. If you use dry colors your work will shade, and you cannot avoid it, no matter how carefully you apply the calcimine or strain and prepare the stuff.

Tinted calcimine should be used fresh, as the lime in the whiting will affect the coloring more or less, if left to stand too long. Even lime-proof colors will be thus affected.

If the calcimine becomes watery it may be because too much water was added to it, or it may have be-

come spoiled by too long standing, as in warm weather or in a warm room. Throw it away. Just as soon as the mixture shows signs of getting thinner it is no longer safe to use, as decomposition has taken place.

Flat Washable Water Paint.—An old formula, but in use to-day. Make up a liquid as follows: Dissolve 2 oz. sal soda (or 4 oz. borax) in ½ gallon hot water. Add slowly 8 oz. crushed white shellac; stir, and gently simmer just under the boiling point, until the shellac dissilves. This will take, usually, a half-hour or more. As some of the shellac will remain undissolved it is well to strain the solution through doubled cheesecloth. When nearly cold, add an ounce of glycerine, 3 ounces of denatured alcohol, and 12 ounces of cold water. This solution will mix with either oil or water paint, makes them work easy, and prevents settling. For a calcimine flat wall paint stir in whiting until of the desired consistency, and add a little raw linseed oil and turpentine.

No. 2.—The same kind of paint, but one having more gloss, is made by mixing 25 lbs. gilders' whiting (or for a better article use English cliffstone Paris white, also known as silver white) with 2½ gallons of water; let it set over night, pour off the water not absorbed by the whiting, then mix with the pulp whiting one gallon of boiled linseed oil. Mix thoroughly, and it will come to a thick whitish paste, which may be thinned for use with raw oil and turpentine. Either of these paints may be tinted any color that will not be affected by the whiting.

No. 3.—Mix together 40 lbs. bolted whiting, 10 lbs. dry zinc white, 10 lbs. white lead in oil, 8 lbs. raw linseed oil, 6 lbs. brown soap, and 26 lbs. soft water. The addition of a quart of copal varnish is desirable. Mix

the dry pigments and water to form a pulp, then mix the lead and oil to form a paste, then add the two together, thinning with the water, to which the melted soap has been added. This will give about 100 lbs. of paint, suitable for application.

Calcimining Hot Walls.—While calcimining is best done in cool or moderate weather, yet we are often called upon to do such work in mid-summer, even in the dreaded dog-days. Some say it is impossible to do a good job of calcimining in dog-days, others assert that they do it without any special difficulty. Hot walls, however, may exist in cool weather as well as in hot, though the difficulty in treating them is greater in hot weather. They should be sized with the following: Take one part of gum shellac and one-half part of sal-soda, and dissolve in hot water, in quantity about two quarts. When dissolution is complete add one quart of raw linseed oil and one gallon of hot water. Mix together and coat the walls with this. The calcimine should be mixed rather stiff, using little water, and when ready for use it ought to be quite cool. It may be necessary to add a piece of ice, and for this reason the calcimine should be made stiff, as directed.

This size is good for almost any kind of wall, with a wash of pearline or borax, or other soap powder, for smoke or grease.

Calcimining Over Ingrain Paper.—As ingrains fade badly it is usual to give them a coating of water color. The green ingrains are particularly liable to fade. You don't need to size the paper, just apply the calcimine on the raw paper, but use the best grade of gelatine glue in the calcimine.

Trying a Color for Lime Effect.—It is best for the workman in calcimine to test a color before going ahead with the work, when tinting is to be done, mixing some of the color with the white stock and trying it on the wall, in a small way. Some walls are more alkaline than others, also some whiting is distinctly alkaline, and will exert a bad effect on any pigment that is not perfectly proof against alkali.

Developing Stains.—A wall or ceiling may be worse stained than appears upon sight, and in order to ascertain just how badly the surface is affected apply a coat of whiting mixed with water to form a thin wash. Do this only after filling all cracks, etc. When this coating dries it will bring out plainly every bit of water stain.

Scaffolding for the Work.—An ordinary room ceiling may be calcimined from a step ladder, by one man, or two men, if in a hurry. A better way is to have two step-ladders and an extension plank, doing the ceiling the short way if it is rather larger than ordinary, but the long way if of average size. By using a single step-ladder one has to move it very often, and there is so much time lost and likewise lost motion or unproductive labor, that it is at once apparent that the plank scaffold is far the best.

An extra large and high ceiling will require a scaffold covering the entire space. This applies to ceilings of public buildings, etc. Or where considerable decorating is to be done on an ordinary room ceiling it will be necessary to have a scaffold cover the entire field.

The sides may be done with a step-ladder, unless high and large, and where a man above and below

will have to work, in which case a plank scaffold will be required. When a scaffold is built to cover the entire space, it needs not be nearer than two feet of the sidewalls.

If the room can be cleared of all furnishings, it will be the better where any considerable calcimining is to be done. If the ceiling is to be done, set your scaffold so that you can work comfortably on it, having it at the right height, and steady, a single plank being sufficient for one man, and where only plain work is to be done.

Covering Furniture When at Work.—If a ceiling is alone to be done, and the furniture is not to be removed, have cloths to cover the carpet and furnishings, and thus protect the same from splashes and other possible injury. The calciminer catering to a good class of customers will have ample supply of covering cloths, and will take every care of the furniture, etc., of the room. He will be as cleanly in the work as possible. Pictures had also better be removed from the walls.

TINTING WALLS AND CEILINGS

Difference Between Calcimining and Tinting

HILE by the term *calcimining* we mean the coating of walls and ceiling with a rather heavy coat of glued water paint, with no ornamentation whatever, by *tinting* is meant the use of a thinner water paint, with colors and stencil or brush ornamenting. Or the tinting may mean simply plain color decoration, taking in the mouldings, centerpieces, etc., and coloring them harmoniously.

The tinting of a room involves a color scheme taking in the furniture, draperies, carpet, etc. That is, all must form a harmonious whole. Thus it will be seen that there is a wide difference between simply calcimining a room and tinting it.

Laying Color Plans for a Job

First ascertain the color composition of the room that is to be tinted. Then make your color plans. Color the rough sketch of the room and its contents, and work from this as an architect would work from plans. If you are not familiar with color theory, so-called, it will be rather an experiment with you. But assuming that you are familiar with color, that you have a good eye for color, and which is a very good thing to have, and with a few rules governing the subject you will have no difficulty in making good. Beginning with the ceiling, there follow the cornice and

centerpiece, if any exist. In the very first place let it be understood that all suction must be stopped. This suction is especially bad in cornice and all moulded work, and two coats of varnish size, wtih some fine pumicestone powder in it, will be found essential. Given a hard, non-porous surface, and there will be no difficulty about tinting.

Rules for Tinting Cornice, Etc.

The rule for tinting a cornice is, to have high lights on the upper parts, and graded down to darker at the bottom. The upper light color may be lighter even than the ceiling color. This is in accordance with the law of light and shadow. Sometimes, however, the upper and lower part will be made light, and the middle darker. Or the whole cornice may be done dark and its members be picked in with other colors, or with gold. The cornice acts as a crown to the wall, and a finish to the ceiling, hence must be made to harmonize in color with both, and yet stand as a distinct detail. The coloring of it must agree with the colors of ceiling and walls, either by harmony pure and simple, or by contrast. The walls and ceiling must harmonize, and the ceiling may be a modification or lighter tint of the walls. Or if the walls are on the yellow or buff order, the ceiling may be a cream or bluish tone. Bearing in mind the law of light and shade, we will place a darker color in the cove than on the moulding. Yet the contrary is sometimes done, placing a bright color in the cove. As a rule it is best to have the cornice somewhat lighter than the wall, and certainly not darker. Finally, aim to preserve color balance, make your work agree with itself, then with its surroundings, as nearly as possible.

How to Mix Colors for Tinting

In mixing colors for tinting observe the rule: For light tints have a white base and tint up to required shade. For dark tints, have the base dark or approximating the color you wish to get. Use fresh colors, and never use too many in any one mixture, for that makes the resultant color muddy. Mix the color with the lightest color first, and when you get it near the color wanted, add the darker stainers, and add a little at a time, until you get it right. If a red is too red, darken slightly with a little green. If an orange color is too bright, temper it with a little blue. And so on through the list.

General Directions

If we decide to make the ceiling a shade of the wall color, then we will mix up some color in a pot and as near the wall color as possible; with this stain some white calcimine to the shade desired for the ceiling. This may be done differently, by simply staining some white with the staining colors, but the first way suggested is very good. After doing the ceiling take some of the ceiling color and add to it a stainer or color for the cornice cove, making it darker, of course. Then the top moulding will have to be done, using a specially mixed color, as desired, but lighter than any we have so far used. The bottom moulding will also be done with a specially prepared color, darker than the upper one. The effect of any proposed scheme of colors for the cornice may be seen by trying them on a section of the cornice, after which they may be removed by washing off. Avoid glaring contrasts, too bright coloring, and strive to produce a harmonious effect something that will seem a part of both wall and ceiling,

and yet not lose its identity as a cornice. A color scheme for a cornice might be laid out, but circumstances vary so much, and color conditions are so diverse that only suggestions, given in a general way, can avail much.

Two colors that harmonize perfectly are better than one dozen that disagree. In other words, use colors sparingly, particularly if not quite sure of yourself. As this little volume is not intended as a treatise on color harmony, color science, or what is known as interior decoration, but merely as a text-book of instructions for plain water color work, not excluding plain tinting of course, we cannot go farther into details along this line at present. In another work, treating on interior decoration, we shall have more to say about color treatments.

The tinter must endeavor to do all his work in one coat, since he can only in one coat produce a pure tint or color; and if a man should have to apply a lake he would be advised, previous to this tinting, to color his size to conform with the color that is to be applied on the walls, or as near as possible. These strong colors should be stippled, so it will take two men to tint a wall in strong colors. The first man will apply the color, and will take his stretches perpendicular about a yard wide, and the second man will follow him up with a stippling brush, and by softly patting the walls obliterate all brush marks. All strong colors must be in a jellied state.

SIZES FOR WALLS AND CEILINGS

OAP-ALUM-GLUE SIZE.—Soak a pound of white glue in one quart of cold water, and when it has swollen and shows it has absorbed all the water it will, pour off the water and pour on enough boiling water to melt it. Shred and melt one pound of bar soap in hot water. Dissolve one pound of pulverized alum in hot water. A quart of water in each of the two latter cases. Now mix together the glue and soap waters, and then add very slowly the alum solution, by constant stirring. Finally add enough hot water to make the mass the consistency of thin syrup.

Size for Stained Walls.—Stains that are caused by water may be sized with a mixture of equal parts of boiled oil, turpentine and japan. When dry, apply a coat of shellac varnish, quite thin, and when this is dry give it a coat of thin flat lead paint. If the stain is not very bad a coat of thin varnish size, followed by a coat of thin flat lead paint will do. The lead paint is applied because the calcimine would scale from the varnish size. No need to coat the entire surface with any of these sizes and paint, only the spots. Suction varnish is cheaper than shellac, and will do for cheap work.

Suction Varnish.—This is a cheap varnish, made from specially prepared rosin, hardened in the process and thinned with benzine, with a little linseed oil and turpentine.

Ceiling Varnish.—Some varnish makers put out a brand called "sealing" varnish. Ceiling varnish is identical with suction varnish. It is a very cheap form of varnish. To make it yourself, take 10 lbs. common rosin and melt it in an iron pot. When melted add ½ gallon of raw oil, and when the mixture comes to a boil add one pound of air-slaked lime, sifted, which stir in gradually. After a while the mass will assume the appearance of a mixture of molasses and flour. Try some of it by drying it, and if it proves to be very brittle the kettle may be taken from the fire and be removed to a safe distance, when a gallon of benzine may be stirred in.

Scrap Varnish Size.—Odds and ends of varnish, from jobs and left-over stuff from pots and cans may be saved for use as suction varnish. Keep in tight cans, and when wanted for use add some benzine to it and thin up and strain. This will give a better size than common suction size.

Glue Size.—Common brown glue is usually employed as a size when a glue size will answer, the glue being ground or so-called frosted glue, and will readily dissolve when boiling water is poured on it. Sheet glue will have to be soaked in cold water until soft, then the water may be poured off and boiling water poured on. Add a pound of glue to the pail of water, thinning up to the required consistency afterwards, regulating the strength of the size to the condition of the wall. Soft walls will require stronger size than hard walls. Glue size is not recommended for calcimining over.

Soap Size.—In Europe the soap size is largely used on walls for a white or quick job. The calcimine is applied while the size is wet. Soft soap is the best form of soap to use. But any common soap will do. Make up a solution of the soap with hot water, making it quite strong with soap.

Cow Manure Size.—The cow manure is steeped in water, then the water is strained off and applied as a size. This has at least the merit of antiquity, and Nelson says it will stop suction and kill stains.

Animal Blood Size.—The blood of beef cattle is caught fresh from the slaughtered animal and mixed with a certain proportion of water, to prevent coagulation. The water must be lukewarm. The size is applied while warm.

Milk and Lime Size.—Slake some fresh quicklime to form a smooth paste, which thin up with skimmed milk. It should be of the consistency of ordinary paint. This size will kill weak stains in plaster.

Size for Greasy Surface.—Thin up some plaster of Paris with water until it is about like calcimine, and apply. By adding some glue size the setting of the plaster will be retarded. Keep the mixture stirred and apply it as soon as possible after mixing.

German Frescoers' Size.—This is simply the soap-alum-glue size. It is esteemed to be the very best all-around size there is. Nelson gives the following formula: Dissolve in separate vessels one pound of glue in two quarts of water, one pound of soap in two quarts of water, and two ounces of pulverized alum in

one-half pint of water. Mix together boiling hot as follows: Pour the glue into a separate vessel, then add the soap, stirring the two well together. Then stir in the alum solution, stirring it in very slowly. This size should be applied while warm, though it may also be used cold. Some prefer to apply the calcimine while the size is still wet. Mr. Nelson adds that the formula may be altered to meet conditions; thus, more alum or less soap may be used, but the proportions given are believed to be the best adapted for general use. Some formulas give one, others two pounds of alum. But complaints come from those who have used large proportions of alum, the mass not mixing well, curdling.

Flat Oil Paint Size.—For colored or tinted calcimine, a good surface may be obtained by coating the plaster with flat oil paint. But the paint must be perfectly dry before applying the calcimine, or the oil will work through and spoil the work.

Size for Soft Plaster Wall.—Use the soap-alum-glue size. It may be used quite heavy.

Size for Hard Plaster Wall.—Use the soap-alum-glue size, only make it very much thinner than for soft walls.

Varnish size, with some zinc white and pulverized pumicestone, is also good. Add a little alum to the calcimine.

Alum Size.—Alum water will stop suction where it is not very bad, although alum is not very often used solely as a size, but as a constituent of a size. It is a good germacide, hence is good for sizing walls before

calcimining. It is also good for sizing over calcimine when a second coat is to be applied. It prevents the second coat of calcimine from rubbing up on the first, and makes the calcimine spread easier. When used simply as a size on a bare plaster wall, add a little glue size to it, unless the alum is intended solely as a germicide. Alum added to a soap size hardens the size.

Vinegar Size.—Vinegar or dilute acetic acid is used for sizing whitewashed walls, to kill the lime or alkali. It is also good for almost any plaster walls, which usually contain considerable free lime. The vinegar should be full strength when applied. White wine vinegar is the best. Acetic acid is the acid principle in vinegar.

Gloss Oil Size.—This is ceiling varnish or rosin oil size. Thin it with benzine, for it is a benzine varnish. It is easy to brush on, and soon dries, leaving a hard surface. It is a very inexpensive size. It stops suction, covers alkali and most stains, yet is not generally liked, though largely used because cheap.

Thin Shellac Size.—For smoke, grease, and bad stains, apply a thin coat of shellac, let it stand 24 hours, then apply a coat of thin flat lead paint.

Varnish Sizes.—Any varnish made with turpentine should be thinned with turpentine, rather than with benzine, which does not mix well with the turpentine. Benzine evaporates quicker than turpentine, hence the varnish thinned with it will dry hard quicker than one thinned with turpentine.

Any good varnish size will hide weak stains, and when applied heavy will prevent alkali from injuring color in the calcimine.

When varnish size is used, see that every part of the wall or ceiling is coated evenly and completely, and do not calcimine over it for at least 24 hours.

Liquid Filler Size.—Some use liquid filler, thinned with turpentine or benzine, claiming that it gives an ideal surface for calcimining over. But as liquid wood fillers vary in quality and at the best are simply a varnish thickened with some base, like China clay for example, it would appear to be cheaper as well as better in many cases, to make up your own liquid filler for sizing purposes, if it is the kind of size you prefer.

Cheap Varnish Size.—There are some things well to know before undertaking the making of varnish sizes. First, it is not the best grade varnish that makes the best varnish size for walls. It will not dry hard enough. A soft varnish, such as ordinary varnishes are, is liable to cause cracking of the calcimine. Gloss oil or rosin varnish is not to be advised, for while it is a quick dryer and dries hard, yet it is not a good dryer, being only apparently dry when we think it quite hard. Zinc white tends to harden the varnish, and also helps in hiding dark spots, and it also prevents glossy spots. The addition of plaster or pulverized pumicestone is advised, as it gives tooth or hold for the calcimine, so that it does not slip or slide when it is being applied. It also gives a more uniform surface. Plaster of Paris does well enough, only it is more liable to settle in the pail than pumice. In any case it is well to keep the stuff stirred while using it. An ideal surface, one that might be called an imitation sandfinish wall, may be made by applying the following size:

Imitation Sand Finished Surface.—Mix together 2 quarts of cheap benzine furniture varnish, 2 quarts of benzine, 24 ounces of dry zinc white, and 32 ounces of pulverized pumicestone. Nelson gives this formula, and states that it gives satisfaction, with least expense and labor. That it will give a wall surface equal to a sand finish.

Size for Sand Finish Walls.—Use *Soap Size,* which see. After applying this size and letting it dry, apply a coat of well glued calcimine. When this has dried apply another coat of soap size, let it dry, then put on the finishing coat of calcimine. Some prefer raw oil with a little litharge added. But this size must have ample time for drying and hardening in, or there will be trouble.

Size for Old Sand Finish Wall.—Usually the best size for this kind of surface is the soap-alum-glue size, first washing off the old calcimine as well as possible. But it does not in all cases prove satisfactory. Then try varnish size, followed with a coat of oil paint, or just the paint and omit the varnish. Be guided by condition of walls.

Size for Coarse Sand Wall.—Give it a coat of calcimine, adding a little alum to it, and with plenty of glue for binder. Apply it quite stout. This will make a good surface if properly done.

Glue Size for Sand Finish Walls.—Boil one pound of good glue and place it in a 10-quart pail; add two quarts of plaster of Paris and stir it well. The glue will prevent the plaster from settling. This size will stop suction and give a good white surface, suitable

for white or tinted finish, causing the finish coat to dry out nice and clear.

This size will not kill stains, hence find out any possible stains and treat them before sizing. Touch up stains with a suitable size, and when it is dry touch up with the glue-plaster size. If the stain persists, repeat the treatment.

Rosin-Glue-Soda Size.—In 3 gallons of boiling water dissolve 10 ozs. washing soda, and add to it, a little at a time, 2½ lbs. powdered rosin, and boil until the rosin is dissolved. Soak 2½ lbs. white glue in 2½ gallons of water 4 hours. Then melt the glue by heat, on stove, then add 5 gallons of hot water. Then mix the two solutions together.

Another Glue-Alum-Soap Size.—This size is said not to scale nor rub under the calcimine coat. Dissolve in separate vessels one pound of good soap, one pound of good white glue, and two pounds of pulverized alum; dissolve each with boiling water. Strain the soap and glue into a pail, add the alum solution very slowly with constant stirring, then add one quart of cold water and the size is ready for use. This quantity will size about 500 square feet of average surface.

Waterglass Size.—The question is asked, is it safe to use waterglass on new plaster walls. Yes, it is quite safe. In contact with lime, it forms an insoluble silicate of lime, consequently it makes a safe ground for either calcimine or oil paint, the size being non-alkaline or inactive because insoluble. The waterglass should be diluted with twice its quantity of water. As it is hard on bristles use a fiber brush in applying it.

Casein Size.—Soak some casein powder in a solution of sal soda until a mucilage the consistency of milk is formed; thin with water to the desired size consistency. Apply by brushing it well into the surface of the wall, no matter what kind of plaster. Before it is quite dry apply a coat of a solution of 40 per cent. formalin. This will act upon the casein, making a sort of leathery coating that will be insoluble in water, acids, spirits, alkalies, etc. Water or dampness cannot penetrate it from the other side of the plaster.

Stopping Suction.—Several formulas have been given, but it may be well to mention this one, although it is not necessary to use it, unless all else fails: Apply alternate washes of a solution of soap, sulphate of alum, green copperas, blue copperas, and white copperas (zinc sulphate). These fluids sink into the plaster and form metallic sebates that are insoluble in water, and by filling the pores with such substance the plaster becomes moisture or waterproof, and suction is stopped.

Size Over Lime Wash.—If in fair to good condition size with vinegar, and when it is dry give it a coat of strong glue size. Have the room warm. If the size works right, remains solid, which can be determined by waiting a day or so, apply the calcimine. It is generally unsafe to calcimine over whitewashed surfaces.

Sizing Loose Sand Wall.—If, when you rub your hand over the surface of a sand finish or rough plaster wall, the sand comes off more or less, size with gloss or rosin oil, adding about half as much benzine as varnish, then stir in plaster of Paris until the stuff is

about like cream in consistency. The best way to add the plaster is to stir it into the benzine, then mix with the gloss oil varnish. A rather stiff brush is good for applying this mixture, brushing it well into the wall.

Another Size for Sand Finish Wall.—Dissolve two ounces of sulphate of zinc into pail of water, and apply it to the wall. When it is dry apply a coat of wall varnish, which, when dry, will give a fine surface for calcimining over.

Size for Rough Sand Finish Walls.—Use the soap-alum-glue size, which see. A size made with one-half pound each of soap, alum and glue, each in a one-half gallon of water, may be thinned with five gallons of water. Before the size is quite dry apply the calcimine. Or a bar of laundry soap dissolved in five gallons of water and applied with a calcimine brush. This is particularly good for stopping suction. Before quite dry apply the calcimine.

Size for Adamant Plaster.—Make up a thin size of varnish, dry zinc white and turpentine, making a thin size and avoid getting in too much varnish, which would make a glossy surface. Some prefer the glue-alum-soap size. These sizes are good for any hard-finish walls.

Sweeet Size.—Dissolve separately in water equal parts of brown sugar or syrup, glue, alum, and each in as much water as equals the weight of an ingredient, and thin for use with more water. The sugar or syrup takes the place of the soap, makes the size flexible, and the whole, combining with the plaster of the wall, forms a sebate that gives a solid surface. Especially useful on bad walls.

Size for Rough Plaster Walls.—Some use boiled oil, others prefer rosin oil, the former the better of the two. Another size, a favorite with some: To a bucket of boiling water add 5 ozs. sal soda, 2 ozs. powdered borax; when these are dissolved add 2 quarts of gloss oil, then boil all together. Now dilute a small portion of the mass with 2 gallons of soft water and mix with a solution made from 2 lbs. of glue in 4 gallons of soft water, then boil the two solutions together for from 20 to 30 minutes, then strain. This is troublesome to make, but it is a very effective size if you wish to calcimine over the walls and have a solid, unspotted job.

Sweet Milk Size.—Gifford, in his book on fresco work, mentions what he terms an excellent method for stopping suction in plaster walls; it is simply sweet milk applied with a calcimine brush. The filling up of the pores of the plaster is due to the glutinous character of milk. It may also be claimed for this size that it does not discolor the walls, if they are white.

Some Notes on Size and Sizing

Some painters have a standard size which they use on all sorts of walls and without regard to the coatings that are to be applied over them. This is manifestly wrong, as different walls require different sizes.

The room should be dry and moderately warm when sizing with glue size, and also when certain other water sizes are applied. And in no case should the room be cold or damp, nor the walls cold or damp, when sizing is being done. It may be necessary, even in summer, to have a little fire in the room.

The question is often asked, is it necessary to size for calcimining? It depends upon the condition of the surface. But as a rule all surfaces are the better for a size coat.

An expert says the result will be much better if the bare plaster walls are coated with a solution of potash in water, which is then to be washed off clean and left to dry. Then a thin coat of fresh lime is to be given, adding a little alum to the wash. When this is dry apply a coat of glue size, or any desired size, and it is ready for the calcimine.

As a rule, a wall that has once been sized, if in good condition and made clean, will not require sizing again.

The soap-alum-glue size will answer for nearly all kinds of walls, and comes the nearest of any to being a standard size; yet there are some walls that require something different,

The value of a size is two-fold, in that it stops suction and usually, though not always, prevents the action of the lime on colors that are not limeproof.

In mixing soap, alum and glue to form a size, be careful to first mix together the soap and glue, and then slowly and carefully stir in the alum. If this procedure is not observed the mixture will appear granulated or flakey, and be spoiled for use.

Glue size will not in all cases stop suction, and when this happens try a varnish size, which see.

Sometimes the glue size will curdle when you add some alum to it; this is because there is some acid in the glue, acid being used to bleach cheap glues. The remedy is in soaking suspected, or tested glues that show acid, in water over night, which will draw out the acid.

In making glue size it is a good way to know your glue, to begin with, and then weigh it out and weigh

the water, or measure the water, this in order to get uniform results in the mixing.

Soak white glue in cold water, and if it swells very much, and does not discolor the water, and has a sweet odor, it is good enough. If left in cold water 24 hours it should not alter much after swelling.

The usual formula for making glue size is one pound of glue to one quart of water; this is to be thinned up as required. One pound of glue soaked and melted in one pint of water will make as thick a mixture as can be made. Thin sheet glue requires from 3 to 4 hours to soak through. Thicker glue will require from 4 to 8 hours. Gelatin will soak in about thirty minutes.

Ordinarily a glue size is made from a pound of common or ordinary glue to the pail or two gallons of water. Cheap glue will not give as much jelled stuff as better grades will. Hence it is probably cheaper to use the higher priced glues. Fish glue is considered to be the best grade of glue, the usual glues being made from hides, bones, etc., of cattle. Whether a glue is in thick or thin sheets makes no difference as concerns the quality. Price is a good index to quality. Gelatin is the purest form of glue, but is not the strongest glue. A medium dark glue may be much stronger.

To test a glue, dissolve some of the suspected article and make quite thin with water. Place this in a clear glass jar, cover it tight, and set it in a room of a moderate temperature. If there is any make-weight material in the glue it will settle to the bottom. If it has been adulterated with dextrin, potato flour or starch, sugar, etc., it will require a chemical analysis. Sometimes dextrin may be detected by its peculiar odor. Make-weight adulterants like plaster or gyp-

sum and starch, will sink to the bottom of the jar. Manifestly an adulterated glue has not the strength of a pure grade glue.

Keeping Size Sweet.—It is best not to mix up a larger quantity of size than is needed for the work immediately in hand, especially in hot summer months. To keep size in a jelly form ready to be used at any time is a great saving. This is done in some shops in colder countries, and may be done here if care is taken and a little preservative used. Mix the glue in very clean cans with the purest water possible, and add about one grain of salicylic acid to the pound. It requires, however, as much care and exposure for chemicals as the time lost in making fresh size for each job. There are now on the market several ground glue sizes that will keep in the hottest weather, and are really worth the extra price asked in preventing waste of both time and material.

Sanitary Glue Size.—A glue size can be made as sanitary as well as oil paint, if properly made. Take good transparent white glue, one that will not dissolve in cold water, but will simply swell and soften. When it has thus become soft, pour off the water and pour on to it water that is boiling hot, putting on only enough to dissolve the mass, then add two ounces of diluted nitric acid, and to this one-half pound of pulverized alum, dissolved in just enough hot water to take it up; thin with water to suitable consistency. This glue size will not become spoiled, and no disease germ can live in it.

A Substitute for Size

The gelatine obtained from a kind of seaweed (Chandrius) is recommended as a substitute for size in the preparation of water paints for ceilings and other surfaces of a like nature. The gelatine is first converted into a thick jelly by boiling it slowly in water for about an hour and a half, and, while still hot, is strained in order to eliminate mechanical impurities. After adding a suitable quantity of boric acid or other antiseptic, which passes into the solution, the jelly is mixed with whiting, the mass being afterwards dried as rapidly as possbile and ground to a coarse powder ready for packing. For use, this powder is mixed to a paste with a little hot or cold water, left for about twenty minutes, and thinned down with cold water to the desired consistency. The object of the antiseptic (boric acid, etc.) is to prevent the otherwise rapid destruction of the gelatine by bacterial agency. Where this occurs, the chalk particles, being deprived of their envelope of gelatine, adhere firmly to the plaster, especially in rooms lighted with gas, the sulphuric acid formed by the combustion of the latter converting the chalk into gypsum, so that they can no longer be removed except by scraping, and therefore the successive coatings soon fill all recesses in the mouldings and spoil their appearance. Thanks, however, to the preservative action of the boric acid, etc., the wash obtained by the above process can be removed by the aid of water and a brush, even as long as three years after application.

The following proportions are given as suitable for the mixture: Seaweed gelatin 1 part, water 22, whiting 40, boric acid ½ part. But these may be vared between wide limits. Boric acid may be replaced by

other antiseptics—for instance, chrome alum or any alkali bichromate—but salicylic acid is unsuitable, since it attacks any metal fitting that may be present on the ceiling, etc.; borax is also unsuitable. The hardness of the paint may be increased by a little pipe-clay or kaolin, and the comparatively low binding power of the gelatine may be raised by the addition of a certain quantity of sugar, syrup, molasses, etc., preferably refined, the raw products containing alkaline salts which absorb water and make the paint liable to peel off. Finally, any suitable coloring material may be incorporated with the paint at the time of use.

Sizing Hot Walls

The new quick plaster, made with strong hydrate of lime, is a growing question with the practical painter. How can this be neutralized successfully?

There are a great many brands of quick plaster, and all differ in their formulas in certain respects. And builders will tell you that the same plasterer will not mix any two batches of mortar alike. If he has a good job on one house, the next day may be bad or indifferent. The plasterer may put too much water in or too cold; also a big chemical difference in water or too much prepared plaster or too little sand, or the prepared plaster may be stronger than the last batch, or he had some left over from another make. In fact, a thousand and one little details will often make a difference in the per cent. of free hydrate of lime on the job.

A great many things have been used with varying results. I will enumerate some of the most used and take each one up separately in order.

Glue is one of the first and oldest used. This did fairly well on old-style walls, where the plaster was

made old-fashioned and allowed to season before putting on the walls. Still I have seen wall finishes of flat lead, calcimine and other finishes come off in sheets, clear to the plaster, showing the bad results of glue. First, it has no damp-resisting qualities, not enough adhesion to hold on succeeeding coats. Last fault, but not least, being animal matter, it soon deteriorates with the least chemical action, no difference how good or high priced it was.

While you may have gotten by on a good many jobs fairly well, from your having extremely favorable conditions; but if you keep following it up it will get you good and hard some time, and one bad job will soon make up the difference saved on the past jobs, and, besides, glue is not sanitary.

I feel that master painters cannot be cautioned strongly enough against its use under present conditions.

Gloss oil is the next. This is often used instead of glue because it is next cheapest. While this is much better than glue in a great many cases, it must be kept in mind that gloss oil is only rosin and benzine cooked up together, and neither one possesses any power to neutralize hydrate of lime. And for that reason is only good to use where there is no hot wall forfirst coat.

Vinegar has often been used to neutralize hydrate of lime, and will sometimes do where there is a very small per cent. of free hydrate of lime. No two vinegars are the same strength, and often you would fail from this alone. Would suggest, if you are a vinegar crank, use commercial acetic acid, which has approximately a given strength, and is the active principle of vinegar. But we cannot recommend its use.

Alum is used with some success. Where everything is favorable you might get by ninety-nine times, but

the hundredth time would prove disastrous. This is not safe to use by itself.

Molasses has been used by some. The writer knows but little about its success. I only have known of its use on the job which worked all right; perhaps conditions were right. But chemically it is not right, and therefore cannot recommend its use.

I know of one court house that was sized throughout with silicate soda or liquid glass, which is hard to put on. But this architect told me he never had a failure where it was used. There is some ground for its use chemically.

The government experts are very favorable to shellac on the theory the shellac seals up the suction, and the alcohol used in the shellac neutralizes the free excess of hydrate of lime. The reports that are received from those that have used it seem very favorable. It should not be used too thick. The only fault found so far is the expense. Some deem it too high in price.

There are several alkali sizes on the market that are good so far as I have been able to learn. These sizes contain carbonate of zinc, which is a great neutralizer of hydrate of lime in itself. Sulphate of alumina and other combinations, with a liquid of Chinese wood oil in various combinations, and are probably safer to use than any other thing, including shellac, as they are more near chemically correct.

Research in this line is constantly going on, and will certainly be solved in the near future for price and positive results.—*John Bowers, Ft. Wayne, Ind.*

CALCIMINE TROUBLES AND THEIR TREATMENT

RAWLING.—Crawling may occur on a sand finished wall as well as on a smooth plaster wall. If a plaster wall is imperfect, with hard and soft spots, the crawling will be on the hard parts. This because the hard spots have retained the size and the soft parts have absorbed it. The remedy is to size the hard, glossy parts with borax water, an ounce of borax to a quart of water; while it is still wet go ahead with the calciming. Apply the borax water with the tips of your calcimining brush, so that some of the calcimine gets on with the borax.

If the crawling is on painted ground, size the paint with vinegar or benzine. A further preventive is secured by adding some oxgall to the calcimine.

Crawling may be prevented usually by adding a little ammonia or lime water to the calcimine, a few drops only. Rubbing the calcimine well into the surface will often prevent or overcome the crawling.

Smoked Ceiling.—If there is considerable soot, rub it off with a cloth, then wash off with sal soda water, or water with ammonia in it, to cut the grease. Finish with soap and water. If not very bad with smoke, apply a thin coating of starch in cold water, let it dry, then brush off. The soot will come with it. Then wash off with soap or ammonia water. Some prefer to brush off all loose smoke, then apply a coat or two of fresh lime wash, made thin. This is very good. Smoke will stain through any number of coats of calcimine.

Pitting of Calcimine.—Same cause as that of crawling, and same cure advised. See *Crawling.*

Spotty Calcimining.—If the job dries out spotted, the foundation is at fault. If the walls are sized with varnish, making a firm foundation, the calcimine will bear out solid. At least it does usually. But if the wall had old calcimine removed and that imperfectly, spots will show. All bad walls should be sized, a good size being made from common hard-drying varnish and benzine, equal parts. Add also a little pulverized pumicestone or plaster, the former being preferred because it stands up in the mixture better than plaster does, because lighter.

Greasy Walls.—Kitchen walls, in private houses and restaurants, are sometimes badly greased. If much of it is present scrape it away all you can. Then apply strong sal soda water, let it dry on. Then wash off with more sal soda water, then with clear water. Let the wall dry, then treat the surface according to its condition. Some shellac after cleaning off grease. The shellac will stay on a surface that is not perfectly clear of grease, but usually a coat of thin calcimine with a little plaster in it will do, before applying the calcimine finish.

Coating Over Old Calcimine.—If the old stuff is intact and surface in pretty good condition, try a size over it. The best size is the glue-alum-soap size (see *Sizes*). This will bind the old paint together and give a good surface for the new calcimine. Another method is to size with thin hot glue size, and when dry apply a size of alum in solution, one pound of alum

to one gallon of water. This will give a hard surface, over which the new calcimine will slip nicely.

Calcimine Drying With Laps.—The best thing to do is to wash it all off clean, then re-calcimine, observing rules laid down under head of *Calcimining*. If you do not want to remove the coating, try a size of alum, and coat over that. Possibly it will turn out a fair to good job, but if not, then you will have the more of a job cleaning off.

Treating Fire Cracks.—Mix plaster and whiting and glue size, and brush this into the cracks. Or two coats of equal parts of turpentine and japan, and when dry give it a coat of flat lead, thin. Or beeswax thinned with turpentine, followed by a coat of flat lead color.

Iron Rust Stains.—Shellac is useful on an iron surface that causes rust through the calcimine. Lead paint, thinned with equal parts of raw oil and turpentine. An iron surface that is to be calcimined should be made clean either with the sand blast or wire brushes, to remove roughness and possible rust. Metal preservative, made by some paint makers, is good.

Fine Cracks in Ceiling.—These may be filled as advised for fire cracks, fine cracks being same kind, only not as fine. A very bad ceiling had better be papered before calcimining.

Cracked, Rough and Hot Ceiling.—It is better to line such a surface with lining paper. The roughest and most badly cracked ceiling, filling the largest cracks and smoothing down the worst roughness, will

look comparitively smooth when papered and calcimined.

Lath Showing Through.—A varnish size is indicated for this defect. The lath show by dark surface corresponding to the size of the lath, the surrounding surface being lighter. Prof. Hall, of Harvard, explains this appearance thus: Air moving at the rate of five feet a second through a narrow passage is resisted by friction about one-fourth as much only as air moving at the rate of 10 feet a second. When the velocity is very little indeed, the resistance met from friction is very little indeed, and therefore air can move, although very slowly, through such invisible pores or passages as there are in the plaster with which the ceilings of ordinary rooms are covered. Looking at the ceiling of a room which has not been whitened for some years, one can usually see darkish stripes corresponding to the spaces between the laths. These are caused by dust left behind by air which has gradually worked its way up through the mortar in the places not blocked by the laths above.

Why Calcimine Scales.—It may be said that this is caused by various circumstances, either through the painter's own fault or by factors beyond his control. In the first case, the paint layer has perhaps been applied too thick (in several layers), or has been mixed with too much size, or prepared with inferior artificial glue. If too much size is contained in one color only, this one in the whole color accords will rise from the ground in sharply rounded flakes. The excess of size is also evident if one rubs the ball of the dry thumb to and fro over the paint. The latter will then become

glossy. If an extraordinary largely quantity of size was added this is characterized by size spots, *i. e.*, dark spots in some places.

Besides these causes, local and physical conditions also enter into the question. A local one is that by constant action of great heat the paint layer is expanded and torn on all sides, whereby it is loosened gradually and drops off; or that by continued action of heat and dampness the size binding agent is destroyed, the paint scaling off in flakes or crumbling to dust.

Furthermore, a poor plastering often causes the paint to find no hold, and consequently to peel off, whereby generally small sand particles of the mortar are carried along. Another cause is found in physical influences manifesting themselves through the drying process, the change of heat and cold pressure.

In the case of fissures, it is seldom that scales are formed, but in the case of cracks the paint appears shoved together in a certain line. It then constitutes a loose elevation, separated from the ground, which readily peels off. For such action the painter is not to blame.

Removing Old Calcimine.—Soak the coating with hot water, using a broad brush or sponge, a little borax in the water aiding the process. After the water has penetrated through the material scrape with a broad scraper, being careful to not cut the plaster. After which it may be well to use a scrub brush and water, to remove remaining stuff. Nelson recommends a piece of zinc for a scraper, as it is less likely to cut the plaster than a steel scraper. To remove the stuff from mouldings, etc., cut a piece of wood to conform with the parts, after softening the old calcimine.

Removing Whitewash.—If there are many coats to take off, it is best to soak the lime with water and concentrated lye solution, one or two pounds to the pail of water. Be careful in handling this caustic. The lye will soak in and rot the lime, after which it may be scraped off.

Or scrape the dry lime, using a plane bit. Nelson advises sizing with white vinegar, which is the strongest vinegar; acetic acd and water, made strong, will also do. While wet with this acid size scrape with the zinc scraper. Then scrub with a stiff scrubbing brush, to remove the loose lime, after which wash off with clear water. Recent and thin coats of lime wash may be removed, sometimes, by applying a thin coat of paste or glue size. This will, on drying, curl and take the lime with it. Then the surface may be swept down. In all cases kill the lime with acid when done and before calcimining.

Removing Old Paper.—Wall paper may usually be removed by repeated wetting with warm water, adding a little borax or ammonia to soften the water. Add a little paste to the water, which will prevent too rapid evaporation of the water. There are now patented devices for softening old wall paper, by means of steam.

Every vestige of old paper and paste must be removed if a solid effect is expected. After removing the paper wash off clean and size with water, to which add a few drops of carbolic acid, as a sanitary precaution.

Removing Varnished Tile Paper.—Soften up the varnish with a solution of sal soda, made just strong enough to cut the varnish, which is soft to begin with. Then wash off with clear water. This leaves the paper

itself, which may be softened with warm water, then scraped off. Some advise scratching the varnish with a chisel, but there is danger of injuring the plaster.

Large Cracks.—Cut out the crack to form a key for the plaster. That is, make the crack wider near the lath than at the surface of the plaster, by which means the plaster, upon drying, cannot fall out. Do not fill a large crack full at first; fill it partly, and when it is nearly dry fill up to the surface. If too much plaster is put in at once the weight of it would pull down and out. When the filling is in, trowel it smooth with the general surface. If the crack is very large, or the surface badly broken, the edges projecting beyond the surrounding surface, better remove part of the plaster, with care, and re-plaster the break.

Never sandpaper cracks, but trowel the plaster filling smooth and level. Sandpapering makes the plaster too porous. Some shellac cracks. Use a small trowel in filling cracks.

Small Cracks.—Very small cracks should be glue sized, that is, the surface all around, and when dry rub in some plaster putty, as made for larger cracks. The size will stop the suction.

Making Plaster Filler.—Do not pour water on plaster of Paris, but sprinkle the plaster into the water, stirring in the meantime. A little vinegar in which some salt has been dissolved may be added to the water for making the plaster compound, as this liquid retards setting, and when it dries the salt makes it very hard. Take of plaster 4 parts and of whiting 1 part, add thin glue size to form a stiff putty. First size the crack with clear water, to prevent it from robbing the

putty of its moisture. This form of plastic will not dry quite so soon as all plaster, but will dry hard in time.

Dry plaster of Paris before using, as it nearly always is more or less undry, and by setting some of it in the oven it will soon dry out.

When you use slaked lime with the plaster avoid getting too much in, adding say one-fourth lime. After the plaster is quite dry it may be shellaced over.

Patent Wall Plaster.—The best way to prepare a patent plaster wall for calcimining is to apply a coat of lead and oil paint, flatted with turpentine. Apply it thin. Always, when painting walls with flat paint, avoid applying the calcimine before the paint has had ample time for drying. Otherwise the oil is apt to work up through the water paint and show as a multitude of fine specks. Sometimes it is best to use glue size with some zinc white in it, and a little plaster or pumice flour to give the surface tooth for the calcimine.

Alabastine Peeling Off.—A correspondent did a church ceiling of wood with Alabastine water color, and it peeled off. The surface had been well prepared. Where Frescoine, another form of water color, was used, the work is all right. The probable cause of the Alabastine cracking was that it being made on a plaster base, and requiring a large amount of glue to prevent its too rapid setting, and on setting taking up water, it could hardly help peeling. On a softer surface than wood it would crack. The Frescoine is made on a whiting base, hence is not so liable to peel or crack. The remedy in the case is to wash off the Alabastine, or perhaps a thin varnish size may answer, avoiding trouble and expense of washing off. If you

do wash off the Alabastine it would be best to apply a thin varnish size, to which add a little ground pumice-stone. On this a coat of good calcimine should give a good job.

Removing Thick Coating of Cold Water Paint.—A strong solution of potash, a pound to the gallon of water, if applied to the stuff until it becomes saturated, then using the scraper on it, will usually prove efficient. If this fails, then try a mixture of equal parts of muriatic (hydrochloric) acid and water. Both solutions may be applied with a fibre brush.

Spots or Tears on Calcimine.—You will not experience this difficulty with first-class water paint; it is caused really by the moisture in the atmosphere condensing upon the surface of the paint and extracting from it some of the gelatinous medium with which it is prepared. In a perfectly good water paint, the surface would be quite impervious to moisture, which could not get through and be absorbed by the substance of the paint, but would merely condense and run off the surface; it will be well known that it is quite possible to prepare a water paint of such quality.

The "rolling" of water paint arises, of course, from various causes. You may, for instance, attempt to paint over a mantelpiece and perhaps find the water paint would roll, on account of the film of carbon deposit with which the surface is coated. You may paint on another part of the room and find an excessive absorption, which will extract the moisture from the paint and cause the rolling. These are things which are met with continually, and any painter who knows his business will know how to overcome them.

Treating Walls that Effloresce.—Some plaster walls throw out considerable saltpeter, and here are some tried and true remedies, given by practical men in answer to a prize offer made by *The Digit,* a paper formerly published by the Muralo Co., New York:

No. 1.—If the walls are not in very bad condition, I take some good cider vinegar and add to it enough acetic acid to make it quite strong. I soak the walls with this acid. That kills the saltpeter. Allowing this to dry a day or two, I apply a size made from best cabinet glue 1 part, alum 1 part, and borax 1 part. I apply this size warm, and let it dry hard. Then I apply a coat of hard oil varnish thinned not too thin with benzine. After standing two days the surface is ready for the calcimine.

No. 2.—If the surface is in very bad condition and a first-class job is desired, no matter about the cost, I give it the acid size as described, also the glue-alum-borax size and the hard oil, and when perfectly dry I cover the walls with cheap muslin, making as few laps as possible. This is soaked with paste that contains lots of alum and borax. When all has dried hard I apply a coat of brown shellac, and when this is dry the surface is ready to receive a coat of calcimine, or oil color if that is desired. It is well to add a little pulverized pumicestone with the shellac, though the painter said plaster of Paris. The former will hold up better than the latter.

No. 3.—The quickest and best way I ever found was to soak the walls with kerosene oil; that will kill saltpeter every time. Then let it dry, which is a rather slow operation. After it has become dry, face it up with plaster of Paris, or before plastering give it a coat of flat oil paint. If it is to be finished in paint then size with glue size and another coat of flat paint.

If to be calcimined, then add some pumicestone or plaster to glue size and coat with that. Then calcimine.

No. 4.—It is always difficult to tell exactly how badly the walls are affected with saltpeter, but I would go about the work this way. If there are any scales, scrape them off. Then wash off the walls with strong soda water as hot as can be handled, and use say about half a pound of soda to the pail of water. Third, allow time to dry out fairly well, then use a neutralizer made of the following: Take boiling water, dissolve as much oxalic acid as the water will take up; add to it about one-quarter in volume of acetic acid, then add about four ounces of powdered alum. This preparation should be put on with a brush and given two applications. Now allow time to dry out good, after which sponge off properly with clean water; it is now ready for your final treatment. If the walls and ceiling are to be finished with calcimine, I would next fill up all cracks with plaster of Paris, and smooth down, then give a coat of glue size, with a little plaster of Paris in it to give it a grip. I would also add a small amount of calcimine to the size, which would help make a smoother surface. Then, after the size was dry, give one or two coats, as the case may be, of calcimine, and there you are. As nice a piece of calcimining as you would want to see.

Saltpeter or Efflorescence in Walls.—This may be cured by firing it with the torch or paint burner, the effect of which is that the substance falls out, leaving a hole to be filled with plaster. Wet the hole with clear water and apply plaster of Paris mixed to a plaster with water. This will take work and time, but no more saltpeter will ever come from those spots.

Wall Stains, Cause and Cure

If a stain shows through the calcimine when dry, coat the stain with a size made from one ounce of sugar of lead and one quart of soft water.

The walls and ceiling of many public buildings, churches, etc., are often seen stained, and if you have a contract for re-calcimining such places it would be well to look up the roof and have it repaired.

On cheap work stains may easily be covered with paper.

Small creosote stains in plaster may be covered with some leaf metal.

Usually a coat of oil paint, flatted, will stop a water stain, but a heavy coat of varnish is better.

There are many remedies, some of them cures, for water stains. Two coats of flat paint is usually recommended, while some advise zinc white mixed with varnish. Shellac does not appear to do. Some say that a coat of hot lime wash, followed by a coat of varnish, is effectual.

Small water stains on a ceiling may be treated with powdered lime mixed with alcohol. Coat the spots with this, and when the size is dry go ahead with the calcimining.

Water stains on a sand finished wall may be coated with oil paint thinned with benzine. Turpentine is better than benzine for the purpose, but is costlier. Shellac also might answer, but its cost is in the way.

A water stained ceiling may be treated thus: If the ceiling has old stuff on it, remove same and make clean. Shellac the stains with white shellac, made thin with grain or denatured alcohol. If no varnish has been used on the ceiling before, then varnish it all over, using ceiling varnish thinned with benzine,

though turpentine is preferred. Stir in about a pound of pulverized pumicestone or plaster to the gallon of varnish.

If there are some stains darker than the rest, thin up some of the varnish and add a little dry zinc white. But this will be unnecessary unless the stains are very dark, and the ceiling is to be white. If the calcimine is properly made and applied it will cover a quite dark surface.

If shellac is applied over a stain it ought to have at least 24 hours to dry in. This in order to allow the alcohol to escape, otherwise it would come through the calcimine and stain it.

One of the best stain killers is zinc sulphate. It is to be mixed with water, making a saturated solution, and apply two coats of it, allowing the first coat time to dry. After the second coat has dried apply a coat of shellac.

Aniline stains should be treated with an alkali. A coat or two of fresh lime wash is good. Make the lime wash heavier than ordinary whitewash, and when it has dried remove it by scraping, then wash off with sponge and water, and finally size with vinegar, to neutralize the alkali. Treat weak aniline stain with clear lime water, which is the water on fresh slaked lime after standing until settled. Weak sal soda or ammonia water also does.

Dealing With the Damp Wall

A new plaster wall requires a long time in which to dry perfectly, so that it may safely be coated with oil or water paint or paper. During this drying-out period the atmospheric carbonic acid transforms the hydrate of lime into carbonate of lime by elimination

of water. The consequence of this slow method of drying is great loss of time, by having to wait before decorating the walls. Many things have been tried to overcome this obstacle, but in most cases without result. A writer in *L'Industrie* states that he himself has made many experiments and finally has succeeded not only in drying new walls, but also humid surfaces by coating them with a waterproof solution imperceptible to the eye, which makes it possible immediately to paint or paper the walls. This coating is made as follows: Dissolve 5 pounds of pure olein in 5 pounds of benzine, and coat the damp surface with the mixture. This solution of oleic acid, owing to its great fluidity, and the capillarity of the mortar, sinks deeply into the latter, and together with the hydrated lime in the mortar produces a formation of greasy lime, which constitutes a waterproof coat. The proportions of the mixture can, of course, be modified according to circumstances; and, instead of benzine, other solvents of the nature of ether and benzol may be utilized. A variation of this method is the employment of other fatty or resinous acids instead of olein. The resinous acids form with the lime hydrate a resinate of lime which has the same waterproof properties as fat lime. Damp or newly-built walls thus coated may, after almost instantaneous evaporation of the liquid, be papered or painted. As in the case of walls in cellars or tunnels, this process can be also employed successfully to coat cement, terrazzo, or mosaic work.

The Sylvester Process.—This is given in another place, but for convenience of ready reference it is given here: Castile or any good white soap, ¾ lb.; shred and melt in 1 gal. hot water. Pulverize alum, ½ lb.; dissolve in 4 gals. water.

Keep in separate vessels, and when cold they are ready to apply. Use a separate calcimine or sizing brush for each. Be careful the soap solution does not froth as you rub it in. Apply the soap solution first, let it dry 24 hours. Then apply the alum solution, let it dry 24 hours. Then apply a second coat of soap solution, let it dry 24 hours. Finally apply another coat of the alum solution.

This work should be done in dry weather, and when the walls are dry. Useful inside or outside.

Finding and Curing the Dampness.—Water in the form of dampness will find its way through most walls, whether brick, stone or what not. Often it is caused by some structural defect. Examine the down pipes, gutters, spouts, see if any are stopped up with leaves, or other trash. Look for leaky water pipes. Maybe the roof is at fault. Or the soil may be very wet, and the water be drawn up by capillary attraction. The dampness may come from a defective east or northeast wall. All such defects will have to be sought out and treated. A brick wall may need re-pointing. It may need painting, to keep out the rain. Walls are sometimes made waterproof with cement. If the dampness comes from the earth, then a trench will have to be dug, to carry the surface water away. A stone wall, plastered, may be cold, and moisture in the room condense on it, making a damp wall surface. Covering such a wall when dry, in dry or warm weather, with brown or some porous paper may prove effectual. Such walls become damp when the outer air is warmer than the walls. Some have nailed lath on such walls and re-plastered it, so making a new surface. This is costly and I do not think often necessary. The Sylvester treatment I believe will cure most

chronic damp walls. It is also good for the outer walls. There are several methods for waterproofing the outside walls. First, the Sylvester process. Then the application of a mixture of equal parts of linseed oil, beef tallow,and rosin, the tallow and rosin being melted and poured into the oil hot; apply hot. Or dissolve alum in turpentine, making a strong alum size, and apply with a brush, doing about a square yard at a time. Immediately apply a thin mixture of litharge and linseed oil, hot. The latter must be applied in successive coats until all suction is stopped. Another formula calls for a coating of one part of paraffin wax dissolved in 2½ parts of heavy coal tar.

For the inside walls nothing is better than the Sylvester process. Other remedies are, a mixture of glue size, made by melting a pound of white glue in one gallon of water, and adding dry white lead enough to form a thin paint. Apply this while hot. Sometimes it is necessary to tear out the plaster from a brick wall and clean the bricks well. Then a mixture of coal tar, lard, and brickdust, placed in a boiler on a fire, is prepared. The directions call for 100 lbs. tar, 3½ lbs. lard, and 8 lbs. fine brickdust. These proportions can be modified to suit the amount of work in hand. Apply with a trowel, and dash sand on it. It is applied while warm. Then trowel it down to a smooth surface. When it is hard-dry it may be plastered over.

Soap-Alum Compound for Cement Walls.—The cement reservoir of the water system at Uxbridge, Mass., which leaked water at the rate of 25,000 gallons a day, when tested, was treated with an inside coat of a composition of soap and alum. The composition is made by heating soap, alum and water in a kettle until the mixture is the thickness of a paste. It

is believed that this will fill the pores in the cement and prevent the water from leaking through. This process has long been known to engineers, and, in spite of the theory of some that it will not last, has given entire satisfaction on more than one occasion.—*Cement Age.*

How to Detect Slight Dampness.—A wall may be more or less damp and yet not be noticeable, although it may show its presence in spoiled work later on, if not treated. If your hand is dry, place it against a suspected wall. If this fails to reveal dampness, and you still believe that the wall is not entirely dry, apply a piece of designers' copying sheet glue, used for transferring drawings or small ornamentations, and, being very sensitive, it will curl if the least dampness is in the wall.

Let the Owner Know.—If you find the walls in no condition for calcimining, let the owner know about it, particularly if it is a contract job. This will save you possible trouble later on, and save the owner loss.

Drying Out Plaster of Paris.—Before using plaster of Paris for repairing cracks and holes, be sure it is dry, for if it is not then it will not be as sure as it otherwise would, nor so dry and free from moisture. A very simple test is to place some of the plaster in a small vial and hold it over a flame, being careful that the heat is not great enough to crack the glass. In a little while moisture will likely gather inside the glass, evidence of water in the plaster. Almost any plaster of Paris will show moisture under this test, for it is very apt to take up moisture from the atmosphere upon standing some time.

To remove this moisture, boil the plaster in a pot, on the stove. Do not add any water to it, of course, for it is the thing you wish to remove. The heat will cause the plaster to boil up, usually in fifteen or twenty minutes. This boiling may be done in a common calcimine kettle, filling it half full, or with as much less as desired.

Plaster of Paris made perfectly dry will fill the cracks better and not shrink as undry plaster will.

Treating a Cracked Surface.—After the cracks have been cut out properly and plastered, they should be allowed to dry perfectly, after which they should be shellaced with a very thin coat to form a film over the plaster. A little dry white lead or plaster in the shellac will destroy its shiny appearance and prevent it from showing through the calcimine . Then apply a coat of sharp leadpaint, with plenty of driers in it. When this paint has had a day or two for drying, though it ought to be hard-dry, give the ceiling a clear coat of size made of the best white glue, some whiting, and a little color, something on the order of what the finish is to be, in case you are to color the finish coat. Otherwise omit the stainers. When this has dried, the finishing coat may be given, the under coat serving as a key and insuring a more solid job.

Detecting Lime in Walls.—All plaster walls contain lime, of course, the plaster being composed of plaster of Paris, which is made from gypsum, a form of lime, and lime itself, some plastering containing more lime than others. Then there is sometimes an uneven distribution of the lime through the plaster, caused by imperfect mixing. The average to fairly good plastered surface may be treated with the vinegar size,

either full strength or diluted, according to condition of plaster. But if it is suspected that the wall is bad with alkali, or to make sure where a good or expensive job is intended, or to make yourself secure in case of a contract, it is better to test the surface, and so ascertain exactly the condition of the plaster. There is a substance called *phthalein,* a substance that has the property of dissolving in the presence of alkali and forming colored solutions. This chemical substance is of a series of artificial organic dyes made as condensed products of the phenols with phthalic acid. It is a colorless crystalline body. The word is pronounced *thal-e'-in,* the accent on the letter e. One dram of this substance to a half-pint of 95 per cent. grain alcohol will make a tester for the walls and ceilings. Apply this fluid to the suspected surface, and if lime exists in excess there will be a discoloration of the spot sized with it, usually of a bright maroon color. I believe some fellow tried to market his idea, maybe tried to patent it, but of this I am not sure.

When you are about to make an estimate on some tinting or calcimining it is important to ascertain the exact condition of the wall surfaces. If, after you have tried the chemical and have found excess of lime present, you lay the matter before the party who wants the work done, telling him what will happen if the work is done on such a surface unless prepared by coating with lead paint, he does not agree to the extra expense of so preparing the walls, you had better let the contract alone.

Even the lead coat may fail to effectually stop the action of the lime, and it may require two coats, or one coat of shellac and another of lead paint, or even need lining with muslin.

DECORATIVE EFFECTS

THE APPLICATION OF DARK WATER COLORS.—We can scarcely with propriety call this calcimining, because calcimining has reference to the application of white or very lightly tinted whting mixtures, while dark coloring has reference to such pigments as the umbers, ochres, yellow, etc., without the least whiting in it. Nor is the application of calcimine and color the same, the former being laid on by the tips of the bristles, whilst colors are usually applied the same as oil color, being brushed out. Calcimine is flowed on liberally and not rubbed out. It is a fact singular as it may appear to some, that almost every young decorator will begin mixing dark or toned colors with a white base, coloring up to the required color or tint. The result is that they get in too much color, in the effort to get the right tone or degree of color. The proper way is to start in with the color that is nearest to the hue or tint we wish to make, taking into consideration the strength or staining power of the color used. There are some colors that do not do well in water color work, just as some do not answer in oil color work. (Nelson.) Some colors, for instance, may be too "rich" for use in water color work. A chrome green or yellow, for example, if too strong or rich, will dry out cloudy and streaky, and this is true also of some other colors. It is nearly impossible to get an even surface when such colors as bone black, Van Dyke brown, burnt umber, raw and burnt sienna, have been used as stainers. These are the worst, but not

the only ones. Great care should be taken when selecting stainers and fresco colors for mixing colors for ceilings and walls. Take chrome yellow, and the only way that it can be worked with any degree of success is by using it reasonably heavy and brushing it out almost like oil paint. (Nelson.) Also lay it off well with the tip of the brush. If it is used thin and flowed on, the different colors will have plenty of room in which to kick up all kinds of disturbance, but when mixed heavier and brushed out well they will be too crowded for independent action.

By following this advice you will save yourself a lot of trouble. There is no difference in this respect, whether you mix your own color or use one which is ready prepared; the chemical action is the same. To give any directions in regard to the amount of water to be used is impossible, as that depends upon the nature and the gravity of the color, and can only be decided by experience.—*The Digit.*

Raised Effects.—Stippling with the brush made for that purpose gives a slightly raised effect, but the work may be made rougher and more raised by means of a block, which is applied to the stuff on the walls and raised, forming by suction a pebbled surface. Then there is the combed effect, using a steel comb and combing the work in a zig-zag manner, up and down, and across also, if you will. For this work the calcimine must contain some plaster of Paris, to make it stiffer than is possible with ordinary calcimine. Yet some raised work is done with just the colcimine, made heavier than usual. Make the wall solid, stopping all suction before beginning, just as you would for a good job of calcimining, and apply the calcimine freely. A textile effect may be obtained by running a fine steel

comb in a horizontal direction, and using a straight-edge to guide the comb, for it will look very much more like a textile surface if the lines are regular. Let this dry, and then apply a size of varnish, which when dry may be coated with some more calcimine, which in turn may be combed in a vertical direction, or at right angles with the first lines, using the straight-edge again.

On this ground you can stencil any desired pattern, or let it go as a finish, by calcimining over it, with a thin mixture, or even without. A frieze may be made by combing the work differently, or by making raised work by stippling or otherwise. This also may be stencilled, and will form a very attractive border if properly done.

Relief Decoration.—Relief work belongs properly to the domain of interior decoration, hence I will not treat of it in detail here. Relief work has long been popular, and with reason, for it is artistic when well done, and quite out of the ordinary decorating. It seems at this time to be just as popular as ever. This relief work may be done on the walls or ceilings with the bulb and plastic compound, or the ornaments may be bought ready for fastening to the surface. There are papier mache relief decorations, also fibrous plaster, and even stamped metal relief work, if I may call it such. The cut-out relief plastic paper decoration now used as a frieze with some wall papers is a still further addition to the relief family.

Sky and Cloud Effects.—Mr. Nelson gives an inquiring correspondent very good directions for getting sky and cloud effect on a ceiling, from which I take the liberty of quoting part, as follows: Four

brushes are required, one for each color, and one for blending. Also three pails are needed. In one pail mix sky-blue, in another pail mix white, to which add a trifle of orange color, enough to take off the white cast. Then mix up a gray color for the shadows. Make this gray a little darker than the blue in tone, and not too reddish, but rather cold.

If the ceiling is small or average size you can do it yourself, particularly if you can handle a brush with either hand, laying in with one hand, and blending with the other. Roughly sketch out the clouds with charcoal, just about as you wish them to appear as to form, size and position. Start in the center of the ceiling, lay in the white to begin with, and put white on that part of the cloud which is turned toward the light (generally the light is assumed to come from the center of the room, in this kind of work) and then take the gray color, and work it well into the white, blending it in softly. Now use the blue to fill in with, blending it in with the white and gray, as the case may be. Take only a part of the ceiling at a time, as the edges will otherwise dry for you, and finish up as you go. In this way you can lay in a ceiling with a sky effect as smooth as with plain color. The selection of the colors, the formation of the clouds, and the shorter or longer blending make the artistic part. The greater the contrast the harder to blend the colors.

Combing and Stippling Composition.—Mix 15 lbs. plaster of Paris with 5 pints of water. For combing with fine combs add more water. For raised work and ornamental decorating mix 12 oz. plaster of Paris with 5 oz. wheat flour, and make into a paste with water. Used also in a bulb.

Roughstuff for Combed Work.—Mix whiting and glue, then add plaster of Paris slowly, and stir well until it becomes heavy, so you can put it on with a brush, having made it any color or tint you wish to have it. If in combing it works short, add more glue. Use steel combs or make them out of hard wood with one-fourth inch long teeth, ends square.

If you use zinc it will work cleaner, will hold the ridge left by the comb, will not fall off or sag.

Rough Stippling.—Rough stuff or thick paint. A mixture of white lead, plaster of Paris and zinc white, mixed with oil, turpentine and japan, or other drier to make it set well, so as it will not sag. Also whiting or silica and white lead, equal parts. Putty can be used instead of whiting, which saves time sifting the whiting, or use either putty or whiting with one-quarter of plaster of Paris. Or the same quantity of putty with about one-eighth part of zinc white, mixed with the thinness as above. It does not matter what the rough stuff is composed of, as long as you make a clean job of the combing, or stippling that will stay where you put it.

The cheapest mixture, as above, will work well if you add zinc for part to be combed.

Stencilling on Calcimining.—Mix the colors with japan gold size, using colors ground in turpentine. Designs may be stencilled on the bare plaster, or on calcimine, with turpentine stain. Or stencil with white shellac, after which stain the whole ground with colored turpentine stain.

To Varnish Over Calcimine.—First apply a size made from gelatine glue, which apply cold and very

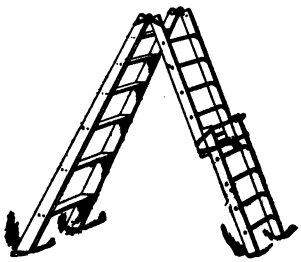
carefully, covering every part perfectly. Maybe two coats would be best. Dextrine and thin cooked starch also are used, but the gelatine is best, we think.

Imitating Ingrain Paper.—Very good imitations of ingrain papers may be obtained by grounding walls with light-colored paint, then coating with a deeper calcimine color and stippling. To carry out the stippling successfully, the surface must be stippled quickly, and from the top of each stretch to the bottom, instead of crosswise, as it is sometimes done in flatting walls. Another thing, too, at intervals of an hour or so, dry stipplers should be brought into use, so as to insure a uniform effect throughout. While one set is being used, the other may be washed and dried, thus allowing the work to progress with only two sets of stipplers in use.

Fine Water Colors.—Water colors for fine decorative work are usually made by grinding the pigment in a solution of gum arabic, dextrine, gum tragacanth, gelatin, Irish moss, etc., in connection with a little glycerine, honey, sugar or glucose, with a little borax, thymol, salicylic acid or carbolic acid, to prevent decay.

Stippling Calcimine.—The early method of water-coloring walls and ceilings involved the simple tinting of the surfaces with a smoothness that was to make it in that respect the peer of oil paint, as well as the superior in other ways. Then came the method of criss-crossing or roughing the surface, so that while it was not smooth, at the same time it gave the effect of solidity that mere smoothness could not give. Now we have the stippled effect, in various degrees of roughness, and very artistic looking it is.

A good wall will need only a single coat of water paint, in order to produce the stipple effect. Stippling is usually done with a brush that is made for the purpose, whether the stuff that is to be stippled is water or oil paint, for both admit of stippling. But if a much rougher raised effect is sought, then a block of wood is used, to raise the stuff up. In this latter case the stuff is made much thicker than when only ordinary stippling is to be done. The ordinary stippling is well for the main part of the walls and ceiling, while the frieze may be done in the rougher effect.



THE CALCIMINE BRUSH

Kinds and Prices

IT is true of calcimine brushes as of all other brushes, the best is the costliest and most economical to buy and use. There is a wide difference in qualities and prices as concerns calcimine brushes, some being sold as low as a dollar, and some as high as $3.00 and $4.00. There are also several styles, such as the New York style, the German style, and others. The price depends on the quality and length of bristles used, as well of course as upon the quality of manufacture, etc. The German style of brush is that made and used in Germany. Many of our workmen prefer this style to any other. It has the advantage of holding and carrying more calcimine than other styles, and is a lighter brush. It also may be used as a stippler brush, or for spreading paste or for sizing walls. It is probably the best of all brushes for applying cold water paint. A brush of this kind may be had made up of gray Russian bristles and set with brushmakers' cement in three sizes, as follows:

$2\frac{1}{2}$ by 7 inches, bristles $3\frac{7}{8}$ inches.
$2\frac{7}{8}$ by $7\frac{1}{2}$ inches, bristles 4 inches.
$2\frac{7}{8}$ by $7\frac{1}{2}$ inches, bristles 5 inches.
Prices about $1.75, $2.75, $3.50 each.

The New York style brush is a very neatly formed tool, having galvanized iron band and plain white wood handle. All white bristles on the outside, with gray mixed center. It is what may be called a cheap brush, but a rather fair one. The widths are 6 and 7

inches, with bristles 5 and 5½ inches. Prices $1.00 and $1.25. A better grade of this style may be had of same widths as the preceding ones, but with all pure Okatka Russian bristles, 5¼ and 5½ inches long. The bristles on the outside are yellow, or unbleached, and the middle is made up of gray bristles. This is one of the most popular of the style. The prices are $2.50 and $3.00. Another style has no particular name, it being in general use for many years. It comes in all qualities and prices. A very good one may be had as follows: 7-inch wide, yellow Okatka bristles, best quality, 5½ inches long, $3.15; and 8 inches wide, bristles 5¾ inches long, $3.50.

The prices here given are taken from a catalogue, and are approximate only. Prices vary a little with dealers and manufacturers. No matter from whom you buy a calcimine brush, get the best, quality to be determined by price.

Treatment of a New Brush

Most calcimine brushes will shed some bristles, when new. The loose bristles should be gotten rid of before putting the brush in color, by gently beating it against the hand or some other object. Then warm up some varnish, and pour it into the stock or part of the wood where the butts of the bristles come, holding the brush handle down and parting the bristles with a piece of zinc or other suitable metal. Then place it where it can stand in a vertical position, handle down, for about two days. Some use boiled oil, but a good elastic varnish is better. This is to prevent the water from getting into the stock or wooden part of the brush, and if you are successful in this you will not be troubled with any more hairs coming out. Still, you will need to repeat this operation after some months.

If it is a used brush and it has become very dry, soak it a while in water, which will swell the wood and fasten the bristles.

A calcimine brush should have long bristles. Some think that the white bristles are more elastic than the dark or black, but this is hardly so. In fact, the gray and black are in all respects equal to the white, the latter being made white by sulphur fumes.

Care of the Brush in Use and Afterwards

Cold water calcimine is very hard on bristles. Never let a brush stand in it, but wash it out as soon as done. Use cold water, not warm or hot, when washing it out. Once a week at least the brushes used in cold water calcimine should be washed out in water containing a little borax powdered, then rinse out in clear water and hang up.

If a brush has been used in a size made of glue, alum and soap, clean it out with warm water, washing it out very thoroughly. Then plunge it into tepid water, twirling it between the hands. Never lay the brush away flat, but hang it up on a nail.

Never clean a pitch-set German calcimine brush with turpentine or benzine, nor use it in oil paint, as these things will dissolve the pitch and loosen the bristles. This brush is intended to be used in water color only.

Hot lime will destroy the life of bristles, and even hot calcimine is hard on them.

Never use a high-grade calcimine brush in cold water paint, as the casein binder in the paint will rot the bristles.

For a hard plaster wall use a brush not less than seven inches wide.

General Directions

If the brush has been washed out just before beginning to calcimine with it, the water will run down the handle. To rid it of water take it in the right hand and give it a quick downward thrust, throwing it with a jerk, yet retaining your hold on it; this will force the water out at the tips of the bristles until the brush is quite rid of it.

When you are done using the brush in calcimine, wash it out thoroughly in cold water, then hang it up in a cool place; or hang it where it will partly dry out, then hang it up in a cool and rather damp place.

If the brush you are about to use has not been used for a long time, see that it is not too dry, in which case it must be placed in cold water to soak a while before using.

Cold water paint being hard on the bristles, at the end of the day, or when done with the brush, wash it out only in cold water, rinse in several waters, then hang up to drain over night. Plaster or gypsum base paints are especially hard on bristles. Also those water paints containing ammonia or lime.

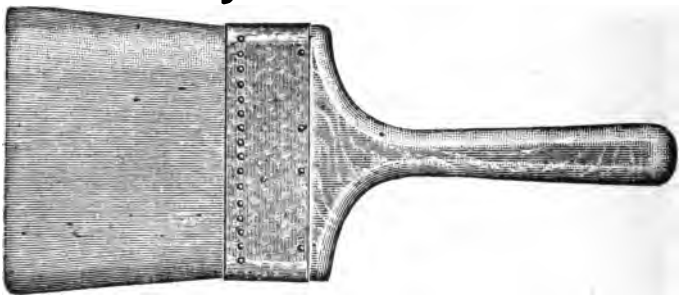
A calcimine brush with long Russia bristles and with the stock not less than six inches wide, is a very suitable kind for general wall calcimining. For sand finished walls use a heavier brush, the German style being the best.

It sometimes occurs that a workman will use a brush in whitewash and not clean it perfectly. After lime dries in a brush it is only with the greatest difficulty that the lime is removed. A small quantity of lime thus left in a brush has spoiled many a ceiling or wall, making it spotty.

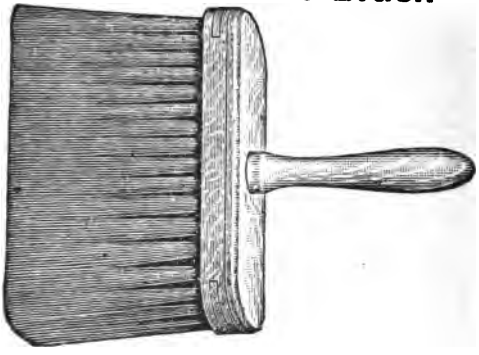
Wash out the sizing brush when done with it and hang it up to drain and dry. See that the bristles are straight while wet and when you hang it up.

Never leave a brush standing in the calcimine or size over night, nor for a little time even.

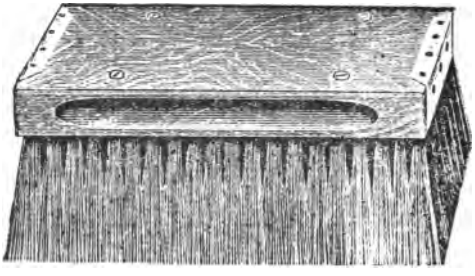
New York Style of Kalsomine Brushes



German Kalsomine Brush

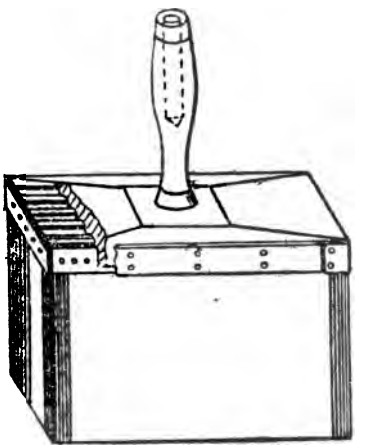


Wall Stippler



A New Form of Calcimine Brush

An Ohio man has patented a novel calcimine brush, which is shown in the annexed illustration, and which is described as a block with a series of longitudinal furrows cut along its under surface, in each of which fits the top of a thin, flat brush, and across each end of a group of brushes thus assembled there is a separate flat brush. After all these brushes have been fit into the block a band is made fast around the whole collection, thus forming one large square brush that will hold about a pint of calcimine at a dip. The claim for this brush is that it will take up more color than the ordinary brush, and hence save time and trouble in dipping into the calcimine bucket.



WHITEWASHING, INTERIOR AND EXTERIOR

AN American painters' journal recently stated that our British cousins use the term *whitewash* for what we know as *calcimine*, but this is evidently an error, they using the term *whitening* where we say calcimine, and *limewash* or *limewashing* where we say whitewash or whitewashing. They do both forms of water color work, just as we do. I have done both inside and outside whitewashing as a painter, receiving the same pay as for painting. In their specifications for painting "whitening" is to be composed of "the best washed whiting and double-size in proper proportions, adding a little ivory black and ultramarine to produce whiteness." Of limewash it is specified that "it may be colored buff if required by adding green copperas to the lime in proportion to the shade required," etc.

Exterior Whitewash.—Whitewash intended for exterior use, when durability is desired, especially where color is added, should be made and applied fresh, or while still warm. Take a barrel, even a flour barrel will do, as its cracks will soon swell shut, or take an oil barrel if you have it, and into it place one-half bushel of fresh stone lump lime, and over it pour hot or boiling water enough to just cover it. Then cover the barrel over with old carpet, bagging, or the like, to keep in the heat. Look at it often, and give it a stir with a long stick, to prevent it from burning. In a little while the mass will have become a smooth paste. There is always some sediment and core in the best

selection of lump lime, hence it is well to pass the lime through a sieve before going farther. Then add to it a solution of table salt, 7 pounds, which has been dissolved in hot water; add also a thin paste of rice flour 3 pounds, a pound of good glue, previously melted, and 5 gallons of water, hot being best. Stir all together and then let the mixture stand a day or so, to settle. Keep covered to prevent dirt from getting in. When ready to apply it, heat it in a boiler. You can figure on this mixture covering at the rate of a pint to the square yard, average surface.

Lime Calcimine.—Slake some fresh lump lime with boiling water, and after it has done slaking, to each six quarts of it (made quite stout) add one-half pint each of raw oil and turpentine. Stir these in and add also 8 ounces of powdered alum. Add any desired color that is immune to lime, and thin up to a whitewash consistency for use. This may be used inside or outside. Less oil and turpentine might do for some work, especially interior work.

A simple whitewash may be made by adding to each pail of lime wash a paste from wheat flour, one-half pound of flour to the pail; stir well into the whitewash.

Skim milk is a favorite binder with some, being useful on inside and outside work.

Whitewash for Ceiling.—Slake the fresh stone lime in the given way, and add to it as a hardener powdered alum, dissolved in the least possible quantity of water. This will do for ten quarts of thinned whitewash. This will make a nice white job, also serve, if you wish it, as a suction stopper on a hot surface, or for a coating over a first coat of calcimine, when a second coat of calcimine is to be given. For a white coating

add a trifle of ultramarine blue to take off the yellow cast. Wet the blue in a little water before adding to the wash.

Durable Whitewash.—A painter asks if glue will do to add to whitewash for exterior use, to make it fast. No, the lime would kill the glue. There are several formulas, some of which appear in this work. Slake one-half bushel of fresh lime in a barrel, with hot water, preferably, enough to cover it, then cover it with some bags or other suitable material, and when it is ready for use dilute it with water to proper consistency, and add 2 lbs. zinc sulphate and 1 lb. table salt.

U. S. Government Formula.—Take of fresh Rosendale cement 3 parts by measure, of clean, fine sand 1 part by measure, mix with fresh water very thoroughly. This makes a sort of granite color, dark or light, according to the color of the cement and sand. If the color is desired nearly white, use 2 parts fresh lime, slake this first, then add 1 part cement and one part white sand. For a brick red color, Venetian red is added to the first mixture; for buff color, yellow ochre is added. The wash must be made as thin as can be conveniently applied with a whitewash or large calcimine brush. Before applying the wash, the surface must be wet with clear water, so as to give the wash an opportunity to hold out until it sets. It is admirably adapted for brick and stonework or rough fences, but will not work over paint or whitewash.

Cold Exterior Whitewash.—Slake one-third of a bushel of fresh lime in the open air by wetting it with water, which will cause the lime to crumble into a fine

dry powder. In the meantime melt 5 lbs. of Burgundy pitch in 2 gallons of raw linseed oil, then add to the lime while hot, stirring it well, 20 gallons of skimmed milk. Now add a little at a time, while stirring, the mixture of pitch and oil, and finally add 120 lbs. of bolted whiting, stirring it well into the mass. Strain, and apply with a wall brush. If too stout add more skim milk.

Exterior Whitewash.—In a barrel place a bushel of fresh lump lime and 20 lbs. beef tallow; slake with hot water and cover the barrel to keep in the heat. When the lime has slaked the tallow will have disappeared, having formed a chemical union with the lime. Dry colors may be added to produce any given tint, only observing not to use colors which lime affects. Colors may be added before adding the water to the lump lime; or the colors may be mixed with alcohol and then be mixed with the lime after it has slaked. Thin with water to make it of a suitable brushing consistency.

Rendering Whitewash Fast or Durable.—Common table salt is frequently added to whitewash, to make it dry hard and have a surface that will not readily rub off nor wash off. Variable quantities are used for this purpose, one formula calling for ½ lb. salt to the 1½ gallons of whitewash, but probably less will answer. Four ounces of commercial alum dissolved in hot water and added to a gallon of whitewash will make it durable. The whitewash should be used at once, after adding the salt or alum. When freshly made whitewash is applied while still warm, it will give a very fast surface without salt or other hardener, though it will rub off slightly.

Alum or salt are good with whitewash on dry or damp surfaces, particularly on damp, for they harden and bind the lime wash. Dissolve 2 lbs. alum in boiling water, and add the solution to a 2-gallon pail of whitewash freshly made. The whitewash should be twice as thick as intended for use, so that by adding an equal amount of water it will be made 4 gallons of whitewash. This may be effected by dissolving the alum in hot water at the rate of a pound of alum to the gallon of water.

Fishbrine is good, if you have it. A few handfuls of table salt thrown into a quantity of whitewash will help materially in making it stick better. Skim milk is a good binder. Glue will not answer. Flour and starch paste are used. Also oil and fats or tallow. Much coloring tends to weaken the whitewash.

CASEIN AND CASEIN PAINTS

THE word *casein* comes from the Latin *caseus,* cheese. The casein as it exists in milk is more properly designated *caseinogen,* since it is chemically changed by the rennet and then combines with the calcium salts present to form the curd, carrying with it in its separation globules of fat.

Pure casein is a white crumbling substance of acid character. The varieties in different milks seem to differ somewhat.—*Webster's Dictionary,* 1912.

Casein as a paint vehicle was known in ancient times, yet its manufacture appears to be the monopoly of a single firm in our country. At least casein water paint is so monopolized, according to Nelson. The casein paint does not appear to be used for interior work, excepting for factories, and then only in white. It contains considerable lime, as a necessary solvent for the casein, and the base is principally whiting and talc (Nelson). If used on a dry surface this paint will last a long time, but dampness seems to disintegrate it. That at least has been my experience with it when used for exterior wood work.

It is said that the paint is recommended by the National Board of Fire Underwriters, for its fire-retarding qualities.

Kept in a dry place it will remain unaltered for years, but then will require soaking in water for two or three days before using.

Casein and lime in proper proportions give caseinate of lime, which is insoluble in water after drying. To

prepare a wall for casein paint apply a weak lime wash, and then apply the caseinate or casein paint. When a package of casein has been opened for use it must be used up at once. It is said that the addition of a little bichromate of potash will increase the weather resistance of the paint, but it gives a yellow shade to the priming.

Ammonia may be used with casein, making a good vehicle. When the ammonia evaporates the casein remains in an insoluble condition, which makes the paint weather-resisting. The evaporation of the ammonia leaving only the casein, it enables the painter to use the casein to its greatest advantage, and while lime remains with the casein, making it fatal to certain pigments when added to the paint, ammonia is not open to this objection. If any trouble is experienced when dissolving the curd with ammonia after keeping them together in a warm place for 24 hours, a little denatured alcohol will remove the difficulty. Another way is to rub up the casein with carbonate of ammonia and water and then dilute. Ammonia casein must be kept in air-tight vessels.

Borax also may be used with casein, to make it soluble. Simply stir the curd in a solution of borax. Soda and potash also are used for making casein soluble, but they have the demerit of being hygroscopic, that is, of attracting moisture.

Upon the whole, lime casein, as compared with other substances mentioned in this connection, is the greatest binding quality. In the early days of cold water paints, borax was used, and it was a failure because the compound formed by it and casein was not entirely insoluble when dry (Scott). Now the casein is mixed with lime; when water is added to this mixture, the casein first dissolves in the lime-water, then

it combines chemically with more lime, and this lime and casein compound, when dry, is insoluble and is a cement of considerable strength. As the paint is put up in dry form, it is a powder containing, like calcimine, whiting and coloring matter, and the proper amount of casein and powdered quicklime, the latter two taking the place of the glue in calcimine.

Casein is used for many different purposes. If it is made soluble with water glass we get a vehicle which will make pigments fast to lime, and is therefore very useful in fresco-painting. It is not necessary to mix the water glass with the vehicle. It is sufficient to give a coat of the silicate over the finished painting. One very important property of casein is that of emulsifying oils and solutions of resins, and the emulsions can be used as distempers without further preparation. A very useful distemper is made with boiled oil or rosin, together with a soluble caseinate, such as those described above. If rosin is used, it should be first ground up dry with the dry pigment. The painting will look very fresh and bright. Old scraping of oil pigment can be mixed with about half their weight of lime casein, and will then give a solution well adapted for stable doors and other places where too much stress need not be laid upon appearance. If such surfaces have already a coat of oil color, we dilute the solution with oil, otherwise with water. The right consistency is only got by practice.—*Scott.*

Casein is made from skim milk, and the making of it is very simple. You heat the milk to 120 deg., F., and commercial sulphuric acid is added until the curd forms; in a large way three to five pounds of 60 deg. B. acid are required for 1000 pounds of milk. Enough acid must be added to coagulate the milk, but if too much is added part of the casein will be dissolved.

The milk is then run up to 150 deg., and the whey is run off, the curd being washed with hot water. It is now in a gelatinous condition, and is made up into balls of six to ten pounds weight; these are drained and dried for two or three days, and when sufficiently dry are ground in a mill and then dried in a kiln, to make sure that all water is evaporated. A little more than two pounds of dry casein may be made from 100 pounds of skim milk.

Of course, it is safe practice to use only permanent mineral colors in casein paints, as, for instance, for black, bone or drop black; for brown, burnt sienna, burnt umber, Vandyck brown; for blue, ultramarine blue or cobalt blue (but no Chinese or Prussian blue); for yellow, ochre, Naples yellow; for red, orange mineral or red oxide of iron; for green, green earth or oxide of chomium green; for white, zinc oxide, lithopone, barytes, whiting, china clay. The consumer will find it to his advantage in purchasing cold water paints to give those in paste form the preference, because here the casein is, on account of the presence of moisture, in more soluble form, accelerating the breaking up of the paint to uniformity and smoothness. Cold water paints with casein binder and containing antiseptics have proved to be of greater durability than the bulk of ordinary water paints.

To Make Casein Paint.—The liquid solution of casein explained under the head of *Casein* may be used with any of the following combinations of pigment material:

To 3 parts best whiting add 1 part asbestine.
To 5 parts whiting add 1 part zinc oxide.
To 7 parts whiting add 1 part pulverized steatite.

To 4 parts whiting add 1 part china clay and 3 parts lithopone.

If the paint works too hard, add a little water.

To Waterproof Casein Painted Walls.—After the casein paint has become dry and hard on the walls, apply a size of formaldehyde of 2 per cent. strength. That is, two parts of the formalin to 100 parts of water.

Casein Cold Water Paint, Interior Use.—Make a solution of 10 pounds of pure casein and 1½ pounds of caustic soda of 58 per cent. This will be sufficient solution for 88 pounds plaster of Paris or whiting.

Casein Cold Water Paint, Exterior Use.—Make a solution of 9 pounds of pure casein and 4 pounds of air-slaked lime. This will make enough solution for 86 pounds plaster of Paris or whiting, adding also ¾ of a pound of pulverized silica.

Solution for Casein.—Soak for one hour 20 ounces of insoluble casein in 160 fluid ounces of cold water. Dissolve in another vessel 3 ounces of potash in 20 fluid ounces of water. Mix and stir thoroughly, then heat on a water bath at 120 deg., F. (and not above 140 F.) for about 10 minutes, then allow it to cool. When cold, add 3 fluid ounces of 40 per cent. solution of formaldehyde mixed with 6 fluid ounces of cold water. Add a little at a time, and stir constantly. This solution will keep for months, and a wall paint made with it as a thinner will resist moisture perfectly. —*Scott.*

USEFUL GENERAL INFORMATION

DISTEMPER. The old French *destemprer, destremper,* meant to mix, to soak. French, *detremper,* to soak, soften, slake (lime). To mix unduly. To dilute, soak, steep, or the like; hence, to dilute so as to injure or weaken the quality of. (Obsolete.) In paint, to mix (colors) in the way of distemper; as, to *distemper* colors with size. To paint in distemper. A process of painting in which the pigments are mixed, or tempered, with an emulsion of egg yolk, with size, or with white of egg, as a vehicle, usually for scene painting or the decoration of walls and ceilings. Also the paint or prepared ground used in this process, or a painting done in it.—*Webster's* 1912 *Dictionary.*

Calcimine.—Also kalsomine. This is simply the water paint now known generally as calcimine, formerly distemper paint. Distemper or calcimine is superior to oil paint in the clearness and delicacy of its tints, and it has for many years been highly prized as a form of interior decoration, and is to-day perhaps more popular than ever before. It does not discolor with age, as oil paint does, but holds its tints or color perfectly for years, unless dampness is present, and it will not stand in the presence of that. It is also a cheap form of paint. Its demerits are, that it will not bear washing, though it may readily be removed by washing and the surface be re-calcimined. Also, it chokes up any delicate mouldings, or ornament. Such places should be done either in oil color, or with very thin water color.

Fresco Painting.—Calcimining and frescoing are different, of course. The former is simply the coating in plain color the surface of walls and ceilings with water color or paint, although stencilling is often done on it that rivals fresco work. There is no confusion of terms here, however, the confusion occurring with the name itself, most people being under the impression that fresco work is simply a more artistic or elaborate sort of decorative work than calcimining or tinting and stencilling. The difference between distemper painting and fresco painting, as explained by Fairholt (*Dictionary of Art*) is this: Distemper is painting on a dry surface; fresco on wet mortar or plaster.

The tempera painting of the ancient Egyptians consisted in covering the wall with a coating of lime or gypsum, and then outlining the ornamentation with red chalk, afterwards filling in the design with black. The artist mixed his pigments with water, and used a palette, attached to his wrist, something like artists do to-day. Grecians and Romans also followed this method of wall painting, and Raphael did his cartoons in distemper colors.

Whiting.—Whiting is made from natural chalk rock, which is crushed to a coarse powder, then is ground under water to a fine pulp, after which it is ground in another kind of mill, and made into a moist cream. Then the cream is run into a large tank of water, where it is stirred, and after a time it is allowed to settle, the soarser parts going to the bottom, and the liquid part is drawn off into another tank, from whence it is run into still another tank, each time losing something of its coarseness. This washing process is called "levigation." By this system of "floating" the whiting in water the last tank will contain the

finest whiting, and the different tanks will yield different grades of whiting. The whiting is now taken from the tanks in a moist mass and dried in a "stove room." The whiting may be sold in this lump form. When moulded in cylinder form it is called Spanish white. This hard lump whiting must be ground in mills before fit for the decorator's use. Ground, then sifted through what is called "bolting cloth," a fine meshed textile material used also by millers for flour. The resultant whiting is known as bolted whiting. But much of the "bolted" whiting on the market is really "air floated" whiting, a much finer substance.

When the whiting settles in the tanks the coarsest part goes to the bottom, the next coarsest part forms a layer upon the first, and so on, the top layer being the lightest and finest. This top layer is known as Paris white, the layer below it is called "gilders' whiting," and the bottom layer is sold as "commercial" whiting, it being used mostly in the manufacture of putty.

The name of whiting in chemistry is calcium carbonate, meaning carbonate of lime.

Paris White.—This is a form of whiting of very fine texture, the result of extra floating, as described in another place. In a very able paper read before an Indiana association of painters a member stated that Paris white lacked body, and was too fine, not being as desirable for calcimining with, bolted whiting being much better. This can hardly be, when we take into account the fact that a gallon of gilder's bolted whiting weighs 5.65 pounds, while a gallon of Paris (English cliffstone white) weighs 7.19 pounds.

The Whites With Various Names.—Frequently when reading about paint or colors we come across

unfamiliar names of familiar substances, and the following little list will tell of the different names certain white pigments are known by:

Whiting—Bolted gilder's whiting, Spanish white, Paris white, English cliffstone white, chalk, commercial whiting. Its name in chemistry is calcium carbonate, or carbonate of lime.

Gypsum—Terra alba (meaning white earth), alabaster, alabastine, plaster of Paris. It is a natural sulphate of lime. Hydrated calcium sulphate.

Soapstone—Steatite, talc, French chalk, hydrated magnesium silicate.

Silica—Silex, quartz, silicon dioxide.

China clay—Kaolin, white bole, hydrated aluminum silicate.

Blanc Fixe—Permanent white, precipitated barium.

Barytes—Heavy spar, Barium sulphate.

Zinc Oxide—Zinc white, oxide of zinc.

Pigments Used in Water Color Work.—

Blacks—Blue black, drop black, lamp black.

Blues—Bremen, Chinese, cobalt, Prussian, ultramarine.

Brown—Vandyke brown.

Greens—Chrome, bottle, emerald, or Paris, milori, olive and ultramarine green.

The Lakes—Carmine, carnation, crimson, garnet, green, maroon, mauve, permanent, rose and royal purple.

Ochres—French, Oxford and golden.

Pinks—Dutch and rose.

Reds—Cardinal, English, Indian, Tuscan, Venetian and Turkey red.

Sienna—Raw and burnt Italian sienna.

Umber—Raw and burnt Turkey umber.

Vermilion—Light and deep English vermilion.
White—Flake, Cremnitz and zinc white.
Yellow—Canary, and L, M, O, DDO chrome yellow.

Weights of Whitings.—A gallon of precipitated chalk weighs 2.96 lbs.; a gallon of gilder's bolted whiting weighs 5.65 lbs.; a gallon of English cliffstone Paris white weighs 7.19 lbs.; a gallon of marble dust weighs 18.41 lbs. Thus it will be seen that the different forms of whiting bulk differently, although all are of the same gravity, approximately.

Pigments Insoluble in Water.—Barytes, bone black, copper blues, cobalt blue, China clay, cobalt green, cadmium yellow, copper greens, chrome, gypsum, iron sesquioxide, litharge, lamp black, lead sulphate, lead sulphite, lead chromate, Mars pigments, ochres, Prussian blue, red lead, strontian white, siennas, smalt, ultramarine, umbers, vermilion, whiting, white lead, zinc sulphide, and zinc oxide.

Binders Used in Water Paints.—The following substances may be used in connection with water paints and colors, serving as "binders," to hold the pigment material well together: Glue, gelatine, water glass, casein, flour, starch, molasses or syrup, dextrine, gum tragacanth, sugar, honey, milk, beer, Iceland and Ireland or Irish moss, glucose and shellac. Gum tragacanth makes one of the very finest binders, but it is too costly for general work. Water glass or silicate of soda is used mainly in connection with a zinc base. Glucose is being used with several very good commercial water paints. Plaster of Paris is used as a base in some water paints, and acts also as a binder, setting hard. Glue is perhaps the most used as a calcimine binder.

PRICE LIST, CALCIMINING AND TINTING

New plaster, smooth walls, white, light blue, or buff, per square of 100 feet.....$ .75
Rough or sand-finished walls, per square..... 1.00
Ten or more squares, 25c. less per square.
Hard oiling and tinting, smooth plaster, ordinary tints, per square 1.25
Ten or more squares, per square..... 1.00
Rough or sand-finished plaster, per square..... 2.00
Ten or more squares, per square..... 1.50
Sizing and tinting sand-finished walls, per square 1.25

Ordinary patching of plaster and preparing same, to be included in above rates.

Strong colors to be charged extra, using your own judgment as to values.

All cutting out of cracks and extraordinary preparation of plaster to be charged for at the rate of so much per hour, and added to the above prices.

Scraping off old calcimine or removing paper, to be charged for at so much per hour.

Water color, plain surface, per square yard..... .10
Tinting walls and ceiling, per yard..... .12
Cornice, per foot, run one color, nor more than 12-inch girth, per yard ..... .05
Each additional color add per foot run, per yard. .02
Center piece, one tint, each.....50c to 1.50
If picked out in colors, each.....$1.00 to 3.00

For cornice enrichments double above rates.

One coat of hard-oil on walls and ceiling, per yd. .08
For such colors as chrome green and yellow, ultramarine blue, carmine, lakes, vermillions, etc., per foot, add ..... .02

Whitewashing, one coat, per square yard	.05
two coats, per square yard	.08
Stencilling borders not over 12 inches wide, one color, per running foot	.07
The same, two colors, per running foot	.10
For each additional color	.07
Sizing and gilding, plain surface, per book	1.00
Mouldings or enrichments on ceiling, walls or woodwork, $1.75 to $2.25, according to amount of cutting required.	
Laying aluminum or other metal leaf on plain or smooth surface, including sizing, per book	.75
If lacquered or oxidized, add	.25
Same on burlap or other woven fabric	1.00
Same, done in relief work, such as ornamental columns, cornices, caps or trusses	1.50

Price on Cold Water Painting.—The charge for applying two coats of cold water paint on an air shaft's walls, including scaffolding, is 12 cents per square yard. But if the space is rather small and hard to get at, it would be well to increase the price accordingly. It all depends upon circumstances, and one must exercise his judgment.

Covering Capacity of Calcimine.—One pound of dry calcimine will cover, when mixed, approximately as follows:

Smooth painted boards,	60 to 80 sq. ft.
Smooth unpainted boards,	50 to 75 sq. ft.
Rough unpainted boards,	25 to 40 sq. ft.
Soft unpainted bricks,	25 to 40 sq. ft.
Hard unfinished bricks,	40 to 65 sq. ft.
Stone,	25 to 40 sq. ft.

Some shop records, carefully kept, show that one gallon of calcimine will cover 270 square feet on average hard plaster walls, 180 square feet on bricks, and 225 square feet on wood.

It was also shown that an average workman, using a 5-inch calcimine brush, coated in one hour 22 square yards of rough wall; 38 square yards smooth wall; 20 square yards of brick wall; flat surface, 40 square yards; ceiling, from step ladder, 25 square yards.

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